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Classification of American Colletinae
(Hymenoptera, Apoidea)¹

CHARLES D. MICHENER

Departments of Entomology and of Systematics Ecology,
Snow Entomological Museum
University of Kansas, Lawrence, Kansas 66045

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ABSTRACT

The subfamily Colletinae consists of two tribes, the Paracolletini and the Colletini. The former, in the Western Hemisphere, is primarily limited to temperate climates in South America although one species reaches southern Arizona. The latter tribe is abundant in both North and South America although the most plesiomorphic genus is found only in temperate parts of South America. The treatment is to the genus and subgenus levels although numerous new species and taxonomic adjustments appear in the Appendix. The American genera of Paracolletini are *Leioproctus* (with 18 subgenera, 8 of them new), *Brachyglossula*, *Lonchorhyncha* new genus, *Niltonia*, *Eulonchopria* (with two subgenera, one new), and *Lonchopria* (with five subgenera, two new). The genera of Colletini are *Mourecoletes* (with three subgenera) and *Colletes*. Comparisons to the Australian paracolletine fauna are included and the Australian taxon *Phenacolletes* is raised to generic rank.

INTRODUCTION

This is a study to the genus and subgenus level of the Western Hemisphere species of the colletid subfamily Colletinae. The emphasis is on the Tribe Paracolletini because the status of the genera and subgenera within this group has been confusing. Unfortunately in some respects it remains confusing, but at least the nature of the problems is clarified. The other tribe, the Colletini, is treated in abbreviated fashion.

The terminology used is essentially that of Michener (1944, 1965). Terms for mandibles are from Michener and Fraser (1978); the only one used repeatedly is pollex for the upper marginal area that usually ends in a preapical tooth.

As in various groups of bees, the shape and dentition of the tibial spurs provides useful characters. Each spur has an inner and an outer margin, both on one surface of the spur. Following tradition, I have used the word *pectinate* for a spur margin with large, long teeth on it (e.g., Fig. 3f), even if only

very few in number. A variant in which the large teeth are crowded together and arise from a slightly thickened part of the spur is called *palmate* (Fig. 24h), even though they do not actually arise from a common point. The word *ciliate* has been used in the past for spur margins with a row of numerous fine, slender, usually tapering and closely packed teeth (e.g., Fig. 3j). This term seems inappropriate considering its common use with reference to flexible, motile, cellular appendages. However, it is perfectly appropriate considering the original meaning for eye lashes, and current use for rows of hairs on leaf margins, etc. I have therefore retained the word. A spur margin with few, short, often angular teeth is called *serrate*; such spurs are rare in Paracolletini. Intergradations among these spur types are common and have to be explained or illustrated.

For ready comparisons among descriptions of genera, variables or groups of variables are numbered. Likewise for

comparisons among subgenera, variables are lettered in a pattern consistent within each genus.

Many structures are illustrated for taxa that have not before been illustrated. However, to save space and money, duplication of previously published illustrations has been avoided. References are included in the text to such previous illustrations.

Drawings are explained in the caption for Figure 2; other captions for drawings are abbreviated. Tibial spurs are illustrated with the more developed margin only (inner margin of inner hind spur, outer margin of outer hind spur).

To save space few taxa are described in full; others are described comparatively. For example, in the genus *Leioproctus*, the subgenus *Perditomorpha* is described independently; then other subgenera are described by telling how they differ from *Perditomorpha*, and more specifically, from the common

characteristics, not those mentioned as exceptional, in the description of *Perditomorpha*.

The lists of species under each supraspecific taxon are not necessarily exhaustive. Some species are unplaced because I have not seen specimens. Some other species are placed only on the basis of literature; their names are marked by asterisks. When a species was originally described under a generic name different from the present genus or subgenus, the original generic name is indicated in square brackets after the author and date for the specific name.

For the methods used in cladistic analysis, see the section on Relationships among Paracolletine Bees.

For sources of borrowed material and a key to the institutions cited where types and other specimens are preserved, see the beginning of the Appendix.

SUBFAMILY COLLETINAE

This subfamily includes hairy colletids whose females have a scopa and whose body form is suggestive of *Halictus* or *Andrena*. Except for *Eulonchopria*, American genera either lack facial foveae or they are broad, shallow, and ill defined. Even in *Eulonchopria* they are not as narrow and sharply defined as in subfamilies like the Hylaeinae. The only other hairy colletids are in the Diphaglossinae (sense of Michener, 1986a). In the Colletinae the stigma is about as long as or longer than the prestigma, often well developed with the apex extending well beyond the point of union with vein r (Fig. 1a), although in the Colletini (Fig. 1b) and in the Australian genera *Paracolletes* and *Trichocolletes* the stigma is commonly reduced with vein r arising at or near its apex. In the Diphaglossinae, however, the stigma is shorter than the prestigma with vein r arising at its apex. In the Colletinae the glossa is shallowly bilobed, the lobes about as long as broad, or if deeply bifid the lobes extend distad and are slender throughout, the hairs not conspicuously branched. In Diphaglossinae the glossa is deeply bifid with the lobes broad basally, extending laterodistad, and

with abundant, conspicuously branched hair.

As shown by Michener (1944), this subfamily can be divided into two tribes, as indicated below. The Colletini has various synapomorphies and is clearly holophyletic but the Paracolletini has no known synapomorphies; it is recognized by plesiomorphies. Presumably it is the paraphyletic group from which the Colletini evolved. At present I see no good reason to recognize the two tribes but will wait until completion of a planned study of higher categories of colletids before formally uniting the two by eliminating tribes in the subfamily Colletinae. Meanwhile no confusion results from continued use of the tribal names.

KEY TO THE TRIBES OF COLLETINAE

1. Basitibial and pygidial plates present, at least in females (pygidial plate absent in most males; basitibial plate absent in a few Australian taxa); prepygidial and pygidial fimbriae of female present; S7 of male with apicolateral lobes of mod-

erate size (sometimes greatly reduced or absent), body of sternum and apodemes constituting major part of sternum. Paracolletini

— Basitibial and pygidial plates absent; prepygidial and pygidial fimbriae absent so that vestiture of T5

and T6 is similar to that of preceding terga; S7 of male with apicolateral lobes greatly enlarged, body of sternum and apodemes reduced, slender, delicate, so that lobes are the major part of sternum. . . . Colletini

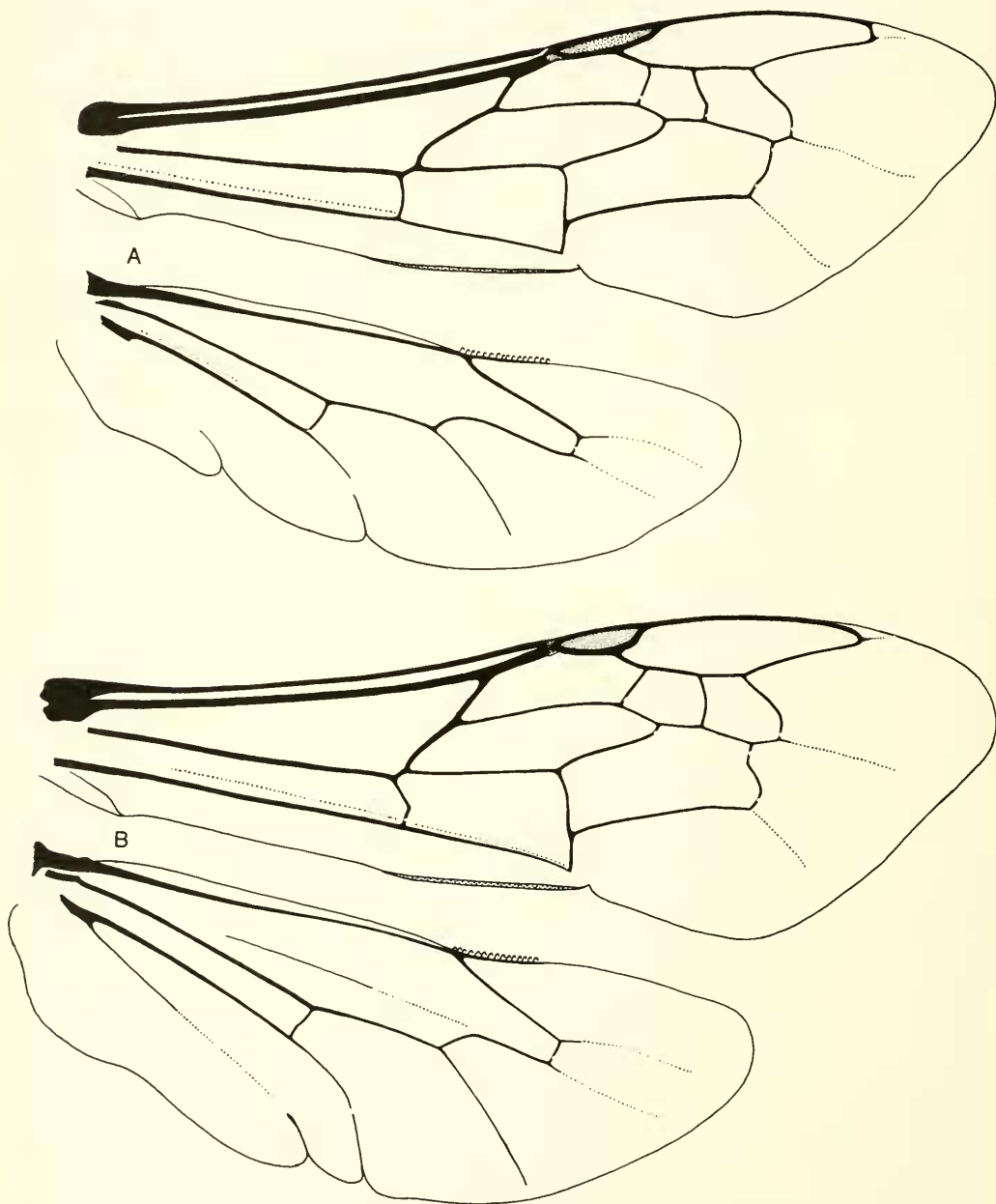


FIG. 1. Wings. a. *Lonchopria* (*Lonchopria*) *zonalis* (Reed). b. *Colletes* *inaequalis* Say.

TRIBE PARACOLLETINI

Paracolletine bees are abundant and diversified both in the Australian region and in temperate South America. The South African genus *Scapter* is not among the genera here discussed. The Australian groups were reviewed by Michener (1965); the American groups are reviewed in the present work. In the following discussion only those Australian genera that are relevant to American groups are considered.

As noted by Michener (1986b), the tribal name that has priority for this group is Neopasiphaeini. However, I have requested that the International Commission on Zoological Nomenclature give precedence to the well established name based on *Paracolletes*.

RELATIONSHIPS AMONG PARACOLLETINE BEES

The group with the maximum number of plesiomorphies (as determined by comparison with outgroups such as the Andreninae) is the mostly Australian subgenus *Leioproctus* s. str. This is clearly a paraphyletic taxon consisting of the species that lack the apomorphies characteristic of other subgenera. I am not philosophically opposed to recognition of a paraphyletic group providing it is readily distinguished from other taxa. If a group of similar organisms is a useful unit, the discovery that a distinctive taxon was derived from it does not make it less useful. But one cannot defend *Leioproctus* s. str. in this way. The best one can say is that provisionally, recognition of *Leioproctus* s. str. is the practical solution to an uncomfortable problem.

A difficulty is that several of the subgenera derived from *Leioproctus* s. str. grade into it, as was pointed out for *Nodocolletes* and *Goniocolletes* by Michener (1965). Thus the justification for maintenance of a paraphyletic group is lost. But it is premature to decide what to do. There are some 120 specific names in *Leioproctus* s. str., many known from only one sex, and there are numerous undescribed species in the group. As collecting in Australia makes more species known, and especially makes known both sexes of more species, it should be possible to discover the relationships among

species of *Leioproctus* s. str. and to develop a more satisfactory classification. Meanwhile, I provisionally recognize that subgenus in the sense of Michener (1965).

In a way the problem would be reduced by synonymizing *Nodocolletes*, *Goniocolletes*, and perhaps also *Microcolletes* and *Cladocerapis* under *Leioproctus* s. str. Yet most species in these groups are readily recognizable as different from *Leioproctus* s. str. and I leave such readjustments for the time when a thorough review of the genus in Australia is made.

One South American species, *L. fulvoniger*, falls within *Leioproctus* s. str. That is, it does not have apomorphies that seem to justify its separation as another subgenus. It is not closely similar to any Australian species and it differs from the great majority of them in having four instead of two apicolateral lobes on S7 of the male. In this respect, however, it resembles the Australian *L. advena* (Smith) and its relatives, which Michener (1965) notes might well be separated subgenerically from *Leioproctus* s. str., but in other features *L. fulvoniger* is quite different from *L. advena*. If *L. advena* and its relatives were separated subgenerically, probably *L. fulvoniger* should also be segregated. Two lobes is likely to be apomorphic since four is a widespread condition in other colletid subfamilies.

From the above, it is evident that paracolletine bees with numerous plesiomorphies (and without striking apomorphies relative to other paracolletines) occur both in the Australian region (including New Zealand) and in South America. Although only one American species is here placed in *Leioproctus* s. str., several other subgenera in South America are particularly similar to *Leioproctus* s. str. These include *Chilicolletes* and *Perditomorpha*.

In restudying the Australian subgenera of *Leioproctus*, I have been fortunate to see new material including the undescribed sexes of several previously described subgenera and species. I am impressed that except for those subgenera mentioned above, the subgenera seem quite distinct from *Leioproctus* s. str. although mostly probably derived from species that would be placed in that subgenus. The other subgenera also seem quite distinct

from American forms although some similarities are mentioned below.

I consider *Phenacolletes* to be a genus rather than a subgenus of *Leioproctus*. In addition to its striking characters listed by Michener (1965), the following may be noted: maxillary palpi short, only about as long as width of galea, four-segmented; basal vein of forewing basal to cu-v (as in another but quite different Australian genus, *Neopasiphae*); keirotrochia of female hind tibia short, forming a distinct band on inner surface. The first two are merely additional apomorphies of a remarkable bee. The short, distinctive keirotrochia, however, are common features of bees and wasps and probably plesiomorphic. Long keirotrochia, more like ordinary hairs, may be an apomorphy of *Leioproctus* and its derivatives. Thus *Phenacolletes* and *Leioproctus* could be sister groups.

American *Leioproctus*, like those of Australia, fall in numerous subgenera. A parsimony analysis of American paracolletine bees using PAUP version 2.2 (Swofford, 1984) was made with the assistance of R. W. Brooks, using 31 synapomorphic characters. (Program options were: adding sequence—closest; swap—global [mulpars]; root—two outgroups, one artificial, i.e., all plesiomorphic characters, the other, *Andrena*; weights—no differential weighting of characters; optimization—two sorts, one using Farris, the other Act.). Fifty equally parsimonious trees were produced using each of the optimization methods. Subsequent reruns were made omitting six variables that appeared four or more times on the tree and had consistency indices less than 0.25. Two other variables that appeared more than once in the tree and two taxa (*Chilicolletes* and *Protodiscelis*) were omitted one at a time to get an idea of the robustness of the tree. The number of “taxa” in the analysis was 33 including two outgroups and several species of *Biglossa* and *Perditomorpha*, each species treated as a separate taxon in the PAUP analysis.

After study of the results of the parsimony analysis, certain variables were recoded and the analysis re-run. Such a *posteriori* recoding was done only when a clear error in the original coding was revealed by the initial cladistic analysis.

The cladistic analysis emphasized the already evident numerous taxa here called the Basal Group or the *Leioproctus* Group. The included taxa are those placed in the genera *Leioproctus*, *Brachyglossula*, *Niltonia*, and *Lonchorhyncha*. These genera and the subgenera of *Leioproctus* have distinctive autapomorphies (omitted from the PAUP analysis), but the synapomorphies that might indicate cladistic relationships are few (only one or two at each step) and usually weak, appearing convergently in other parts of the study. All the cladograms have at least two effective trifurcations or quadrifurcations in the Basal Group. PAUP found different and equally parsimonious cladograms for this group. Omission of a taxon or a single variable caused major changes in these relationships. It follows that discovery of a new taxon or variable could have the same effect; within this group the results are anything but robust. I have no confidence in most of the relationships indicated and for the present regard the conservative cladogram for the Basal Group to be like a bush with 20 stems arising from a common base, their cladistic relationships unresolved.

Other than *Leioproctus*, those taxa accorded generic rank have numerous and conspicuous autapomorphies. Thus their recognition is on a phenetic basis. All may be derivatives of the Basal Group but could be its sister groups.

There are, however, several relationships within the Basal Group that seem robust, appearing repeatedly among the cladograms generated by PAUP. These are as follows:

The subgenera *Reedapis* and *Cephalocolletes* consistently appear as sisters. There is no doubt but that this is correct unless *Cephalocolletes* is derived from *Reedapis*. *Reedapis* does have its own autapomorphies, however. Thus one of the 20 stems is bifurcated.

The subgenera *Glossopasiphae* and *Tetraglossula* often appear as sister groups, partly because of the shared elongate, bifid glossa. I believe they are convergent in this feature, because of the great differences in labral shape, lateroapical labral lobes, male mandibular dentition, etc. The subgenus *Protodiscelis* appears as the sister group to *Glossopasiphae*-*Tetraglossula* or only of the lat-

ter. Its relationship to *Tetraglossula* appears to be phylogenetic, as indicated by three synapomorphies: labral shape, apicolateral labral angles, and simple mandibles of the male. Thus a second stem is bifurcate, showing the relationship of *Protodiscelis* and *Tetraglossula*.

The subgenus *Torocolletes* and the genus *Lonchorhyncha* appear consistently as sister groups. I do not believe that they are sisters, however, because of the strikingly different genitalic and sternal characters, autapomorphic for *Lonchorhyncha*, and because of the functional association and likely convergence of the characters that unite the two taxa. These taxa have slightly and greatly elongated malar areas, respectively, and associated with this feature, as in various other bees, the clypeus is elongate, shifted downward, and strongly convex and the labrum is less transverse (i.e., more elongate) than in most related bees. Redefining and recoding these variables could correct this problem. Presumably these characters are associated in providing space for an elongate proboscis, and could be considered a single character. However, in other parts of the tree the convex clypeus and less transverse labrum appear independently, and not associated with an elongate malar area. If these characters were regarded as a single feature to correct the problem with *Torocolletes* and *Lonchorhyncha*, useful information would be lost elsewhere in the study.

The subgenus *Spinolapis* and the genus *Niltonia* appear as sister groups, partly because the females share a ciliate or micropectinate inner hind tibial spur and a strong metasomal scopa. Again, I do not believe that these taxa are related, in part because of grossly different male genitalia and sterna, autapomorphic for *Niltonia*. The spur and scopal characters are weak, because they reappear at various places elsewhere in the cladogram. (There are seven changes of the spur variable and three of the scopal variable in the initial cladograms.)

In summary, the reliable aspects of the cladogram for the Basal Group consist only of lines for each taxon diverging from a common base, except that the subgenera *Reedapis* and *Cephalocolletes* are sister groups, as are *Protodiscelis* and *Tetraglossula*.

All the PAUP trees show, emerging from the Basal Group and usually as a sister group to *Leioproctus* (*Nomiocolletes*), a substantial group including *Lonchopria* and its allies. It is here called the *Lonchopria* Group. Its synapomorphies include the lack of an apex of S8 of males that looks like a pygidial plate, and except for *Lonchopria* (*Lonchoprella*), the distinctive features of the tibial scopa and hind basitarsus of the female as described below. Original PAUP trees showed *Eulonchopria* as the sister group to the rest of the *Lonchopria* Group. *A posteriori* recoding of the scopal variables resulted in placement of *Eulonchopria* at the very base of the *Lonchopria* Group, either as its sister group or sister group of *Leioproctus* (*Nomiocolletes*), and for the present I place it as the most unusual member of the Basal Group. In any case, it is not reliably associated with the *Lonchopria* Group. So restricted, the *Lonchopria* Group consists of the genus *Lonchopria* only. The almost palmate inner hind tibial spur of the female (Fig. 24h) is a character of this genus.

Within *Lonchopria*, the subgenus *Lonchoprella* is the sister to all the rest. The subgenera *Lonchopria* s. str. and *Ctenocybne* together are the sister group to the subgenera *Biglossa* and *Porterapis* together.

While it is reasonable to suppose that the Colletini (*Mourecolletes*) arose from somewhere in the Paracolletini, there is no good evidence as to which paracolletine genus is its sister group.

TRENDS IN AMERICAN AND AUSTRALIAN PARACOLLETINI

There are certain interesting similarities between American and Australian groups other than *Leioproctus* s. str. which is discussed above. The inner hind tibial spurs of females in *Leioproctus* and the related genera (*Brachyglossula*, *Eulonchopria*, *Lonchorhyncha*, and *Niltonia*; in Australia, *Phenacolletes*, *Neopasiphae*, *Paracolletes*) are coarsely pectinate to finely micropectinate or ciliate. In *Lonchopria*, however, they are almost palmate because the large teeth arise crowded together, from an often thickened region of the spur. Clearly this is an apomorphy. The Australian genus *Trichocolletes* has similar spurs, and its scopa

and hind basitarsus are also suggestive of those of *Lonchopria*. Note also the similarity in the male S8 between *Lonchopria* (*Ctenocybne*) and *Trichocolletes*. The reduced stigma of *Trichocolletes* (also *Paracolletes*), however, is an apomorphy unlike that of any American paracolletine.

In small size and general aspect, many species of the American subgenus *Perditomorpha* resemble those of the Australian subgenus *Microcolletes*. However, they are not closely related. *Perditomorpha* has two submarginal cells, and the propodeum has a distinct and rather long subhorizontal basal area, whereas *Microcolletes* has three submarginal cells and a largely or wholly declivous propodeal profile.

The Australian *Colletellus* is similar to the American *Perditomorpha*, agreeing in having two submarginal cells, a subhorizontal propodeal base, and numerous other characters. Both subgenera have short antennae although the flagellar segments of the male of *Colletellus* are shorter than in most *Perditomorpha*. I suspect that the similarities are convergent since *Colletellus*, like most Australian *Leioproctus*, has only two apicolateral lobes on T7 of the male while *Perditomorpha*, like most American species, has four (i.e., two on each side) or more.

In certain ways evolution in American and Australian *Leioproctus* has followed different paths. For example, reduction from three to two submarginal cells has been much more prevalent in America than in Australia. In America ten subgenera including *Perditomorpha*, the largest American group (about 45 named species), have two cells. The reduction must have occurred at least twice, for the subgenus *Sarocolletes*, which has apomorphies such that it could not be ancestral to other subgenera, has both two- and three-celled species. In the genus as a whole, two-celled species are much more numerous than three-celled species in South America. In Australia, however, there are only six two-celled subgenera, all very small except *Euryglossidia*, for species of which about 20 specific names have been proposed. Three-celled species are far more numerous than two-celled species in Australia.

Similarly, subgenera with the propodeal profile vertical or steeply slanting are numer-

ous in Australia, although because of the many species in *Leioproctus* s. str., most Australian paracolletine species have a more or less horizontal basal propodeal zone. In America, however, nearly all subgenera have such a basal zone, although it is short, ill-defined, and sloping in various groups, especially *Nomiocolletes*.

A striking feature of diverse American taxa is the well developed sternal scopa of females, in addition to that on the hind legs. Many and possibly all Colletinae can be collected with abundant pollen sticking to the hairs of the sterna. However, in some taxa, such as *Leioproctus* (*Spinolapis*), the sternal hairs are abundant and rather long, suggesting a scopa. In eight American taxa, not all closely related to one another although all are in the Basal Group, the sternal scopa is fully developed, often as conspicuous as in the Megachilidae and capable of carrying a large pollen load. The following taxa have a full sterna scopa: *Leioproctus* (*Glossopasiphae*, *Sarocolletes*, *Hoplocolletes*, *Tetrarglossula*, *Reedapis*, *Cephalocolletes*), *Brachyglossula*, and *Niltonia*. Some species of *Leioproctus* (*Perditomorpha*) [e.g., *L. brunerii*, *arnauellus*, and *inconspicuus*] have a moderately well developed metasomal scopa.

BIOGEOGRAPHY

Given the unresolved nature of the cladistic analysis of American and Australian Paracolletini, a conclusive biogeographic analysis is not yet possible. Nonetheless some comments seem justified.

The presence on New Zealand of some species of *Leioproctus* s. str. not particularly different from Australian species suggests that these bees have crossed from Australia to New Zealand since these lands were in approximately their present positions. The distance is about 1900 km. It follows that, while the Paracolletini is undoubtedly an ancient group, it does not necessarily date from the time in the Cretaceous when Australia, Antarctica, and South America were in contact. It could have arisen much more recently and crossed water gaps of up to perhaps 2000 km between these continents to attain its present distribution.

The taxon with the greatest number of

plesiomorphies, *Leioproctus* s. str., is richly represented in the Australian region and occurs also in South America (one species). Even in the absence of groups defined by synapomorphies, this distribution suggests an origin in Australia and subsequent migration to South America where radiation occurred to produce the diverse American fauna, but where one species retained the attributes used to recognize *Leioproctus* s. str. Still present in the American fauna are other species but little divergent from *Leioproctus* s. str. (e.g., *Chilicolletes*) as well as those that have diverged greatly and are here recognized as generically different from *Leioproctus*. Of course ancestors of some such groups could have arrived independently in South America. To judge by morphological differentiation, the migration to South America, probably via Antarctica, long antedates the dispersal to New Zealand.

The Colletini (*Mourecotelles*-like bees) must have arisen from paracolletine ancestors in South America (possibly Antarctica), for Colletini do not exist in Australia. In the form of the derived genus *Colletes*, this tribe then spread to all continents except Australia.

Lonchopria has interesting apomorphic similarities (hind tibial spur of female, S8 of male, etc.) to the Australian *Trichocolletes*. In America there is a near intermediate between *Leioproctus* and *Lonchopria*, namely *Lonchopria* subgenus *Lonchoprella*. Thus it is likely that *Lonchopria* arose from a *Leioproctus*-like ancestor in South America. If the common characters exhibited by *Lonchopria* and *Trichocolletes* are homologous, then the ancestors of *Trichocolletes* may have migrated from South America to Australia via Antarctica. Given the prevalent westerly winds, such a migration is unlikely.

The reduced stigma characteristic of *Trichocolletes* is found also in the Australian genus *Paracolletes*, which is more like *Leioproctus* in other features. Such a stigma is apomorphic relative to the larger stigma of other Paracolletini. There is therefore the possibility that *Trichocolletes* is derived from *Paracolletes*-like ancestors and that the similarities of *Trichocolletes* to *Lonchopria* are convergent. Because a reduced stigma can be found in

diverse large, fast flying bees, while the spur characters of *Trichocolletes* and *Lonchopria* are not found in other bees, it seems likely that the stigmal and related venational characters are convergent and that the spur indicates phyletic relationship.

KEY TO THE AMERICAN GENERA OF PARACOLLETINI

1. Preoccipital carina strong, often lamella-like; pronotum dorsolaterally with strong transverse carina or lamella extending onto pronotal lobe; hind tibial hairs of female shorter than tibial diameter. *Eulonchopria*
- Preoccipital and pronotal carinae (or lamellae) absent; many hind tibial hairs of female as long as or longer than tibial diameter. 2
2. Malar space nearly as long as or longer than eye (Fig. 23a-c); S8 of male weakly sclerotized, without apical process. *Lonchorhyncha*
- Malar space little if any longer than flagellar width, usually virtually absent; S8 of male with strong median apical process. 3
3. Labial palpi enormous, 8-9 mm long, in repose reaching S3 or S4; claws deeply cleft, the two rami similar in shape and of almost equal length. *Niltonia*
- Labial palpi ordinary; claws with inner ramus shorter than outer and differently shaped, at least in female, or rarely simple. 4
4. Forewing with three submarginal cells, second usually about as long as third on posterior margin (but see *Lonchopria* s. str., Figs. 1, 31h); apical process of S8 of male without flat apical region like a pygidial plate; inner hind tibial spur of female coarsely palmate-pectinate (Fig. 24h); tibial scopa except in subgenus *Lonchoprella* extremely dense, hiding tibial surface; hind basitarsus of female weakly concave on outer surface near upper margin, this surface very different looking from tibia, surface easily visible among hairs

- usually shorter than those of inner surface. *Lonchopria*
- Forewing with two submarginal cells or if with three, second much shorter than third on posterior margin (except in subgenus *Cephalocolletes* and most specimens of subgenus *Reedapis*); apical process of S8 of male with flat, bare apical region on upper side, looking superficially like a pygidial plate and usually exposed at apex of metasoma; inner hind tibial spur of female ciliate to coarsely pectinate, not at all palmate (Fig. 5f, g); female scopa not hiding tibial surface; hind basitarsus of female flat or convex on outer surface which is superficially similar to tibia and with hairs longer than those of inner surface (ignore hairs of upper margin). 5
5. Stigma small, vein r arising well beyond middle, costal margin of marginal cell 2.5-3.0 times as long as stigma; propodeum almost wholly declivous in profile; volsella of male large, vertically expanded, reaching dorsum of genital capsule, bifid; mandible of male tridentate. (Mid and both hind tibial spurs strongly curved and coarsely pectinate or outer hind spur of male sometimes dentate or almost simple; forewing with two submarginal cells.). *Brachyglossula*
- Stigma elongate, vein r arising at or slightly beyond middle, costal margin of marginal cell 1.5-2.0 times as long as stigma; propodeum usually with subhorizontal or sloping basal part curving onto steeply declivous posterior surface; volsella more or less horizontal, ventral, not attaining dorsum of capsule; mandible of male simple or bidentate. (Tibial spurs not curved and coarsely pectinate, or if so, as in some *Reedapis*, then forewing with three submarginal cells.). . . . *Leioproctus*

Genus *Leioproctus* Smith

This large genus contains many subgenera and species and is found both in the Australian area and in South America. The most distinctive

characters are italicized in the description below, and indicated in the key to genera. For a treatment of Australian subgenera, see Michener (1965).

Description: 1. Integument black, metallic blue or green, sometimes with the metasoma red; metasomal hair bands and colored integumental bands present or absent. Length 5-16 mm. 2. Face flat to moderately convex, supraclypeal area not much if any elevated above clypeus, frequently elevated above frons. Inner orbits converging to slightly diverging below. Malar space very short (in *Torocolletes* about as long as minimum flagellar diameter). Clypeus usually rather uniformly punctured, without or with only weakly evident upper median depressed, densely punctate area, or such area evident as in *Kylopasiaphae* and a few species of *Perditomorpha*, often surrounded by extensive impunctate areas as in *Lonchopria*. 3. Facial fovea as in *Lonchopria* or slightly more clearly defined at upper end between ocelli and eye. 4. As in *Lonchopria*. 5. Mandible of females and most males with pre-apical tooth on upper margin; expansion or tooth on lower margin (as in many male *Lonchopria*) absent. 6. Labrum variable, *usually more than three times as wide as long*. 7. Proboscis variable as in *Lonchopria*; palpi also variable in length. 8. Male antennal flagellum variable in length. 9. Propodeum variable as in *Lonchopria* but dorsal surface sometimes longer than metanotum, subhorizontal, and up to two thirds as long as declivous surface in profile. 10. Front basitarsus of female usually without well formed comb of hairs on outer margin, but such a row of hairs present in subgenera *Cephalocolletes*, *Nomiocolletes*, *Reedapis*, and *Spinolapis*. 11. Inner hind tibial spur ciliate to coarsely pectinate, *bases of teeth in a uniform series, not crowded and diverging from one another as in females of Lonchopria*. 12. Femoral and tibial scopae variable, *tibial scopa not so dense as to completely obscure tibial surface*; hairs of inner surface of hind tibia moderately long, simple at least in a limited area, not forming zone of short keitrichia. 13. Hind basitarsus of female slightly tapering but *apex more than half as wide as width near base*; outer surface flat or convex, *vestiture superficially rather similar to that of tibia, hairs longer than those of inner surface*. 14, 15. basitibial plate as described for *Lonchopria*, that of male always complete. 16. Wing vestiture variable; two or three submarginal cells, if three, second much shorter than third on posterior margin except in most specimens of *Reedapis* and *Cephalocolletes*; relation of basal vein and cu-v of forewing variable. Stigma moderate sized, costal margin of marginal cell 1.5 to 2.0 times as long as stigma, vein r arising at or slightly beyond middle, margin within marginal cell usually convex; apex of marginal cell as described for *Lonchopria*. 17. Jugal lobe variable in length. 18. Sternal scopa present or absent. 19. S6 and pygidial plate variable. 20-22. S7, S8, and genitalia of male variable. *S8 with apical process ending in rounded, beveled area that is exposed at rest and*

resembles a pygidial plate.

Distribution: This large genus occurs in Australia (north to New Guinea and Misool), New Caledonia, New Zealand, and temperate South America. *Leioproctus* s. str. occurs in the Australian area (see review by Michener, 1965), with a single species in South America.

Comments: In 1965 I used *Leioproctus* in a broad sense to include also the species here placed in the genera *Lonchopria* and *Brachyglossula*. Moure, however, in various papers cited below, recognized the groups that I place as subgenera at the generic level. I now feel that each of these arrangements fails to indicate relationships that are evident and I therefore have separated the three above-named taxa at the genus level. At the same time, I have included *Hexanthes* and *Tetraglossula*, hesitantly recognized at the genus level in 1965, in *Leioproctus*. So constituted, *Leioproctus* is a paraphyletic group from which *Lonchopria*, *Brachyglossula*, and probably the other American paracolletine genera, were derived in South America and *Neopasiphae*, *Paracolletes*, and *Trichocolletes* in Australia. *Leioproctus* is nonetheless definable and useful. Until more species are known and cladogeny better studied, especially in the diverse Australian fauna, there is no point in attempting to make a classification that mimics a cladogram, for there is no one correct or even generally acceptable cladogram and great instability would result.

KEY TO THE AMERICAN SUBGENERA OF LEIOPROCTUS

1. With three submarginal cells 2
- With two submarginal cells 14
2. T1-4 in female and 1-5 in male with enamel-like apical margins, yellowish, green, blue or whitish in color, at least partly impunctate and hairless *Nomiocolletes*
- Terga with hairs and punctures near apical margins, which are not distinctively colored or are only translucent or brownish 3
3. Dorsolateral angle of pronotum produced as small tooth projecting upward and outward (smallest in male); basitibial plate of female not easily seen because its hairs are erect, similar to those of adjacent parts of tibia, and largely hiding marginal carinae *Halictanthrena*
- Dorsolateral angle of pronotum low, rounded, scarcely evident; basitibial plate of female distinct, hairs short, appressed, different from those of adjacent areas, marginal carinae clearly exposed. 4
4. Second submarginal cell on posterior margin usually at least three fourths as long as third; second transverse cubital vein usually curved in a manner parallel to third so that anterior margin of third submarginal cell is at least two thirds as long as posterior margin. 5
- Second submarginal cell on posterior margin much shorter than third; second transverse cubital vein usually straight, at least not curved parallel to third; anterior margin of third submarginal cell usually less than two thirds as long as posterior margin. 6
5. Mandible of male with preapical tooth; outer hind tibial spur of female pectinate, although more finely so than inner spur; metasoma with at least weak blue reflections *Reedapis*
- Mandible of male simple; outer hind tibial spur of female coarsely ciliate; metasoma black. *Cephalocolletes*
6. Thorax dull, minutely roughened, almost without punctures; malar area as long as minimum diameter of flagellum; clypeus protuberant in lateral view by fully eye width *Torocolletes*
- Thorax with at least some areas of shining integument between strong punctures; malar area linear; clypeus not or little protuberant 7
7. Males 8
- Females 11
8. Subantennal suture little over half as long as diameter of antennal socket; supraclypeal and subantennal areas impunctate, shining, hairless, in contrast to adjacent areas *Holmbergeria*
- Subantennal suture as long as diameter of antennal socket; supraclypeal and subantennal areas punctate, with hairs. 9
9. Gonoforceps hairy to base; gonobase half as long as gonoforceps; apex of S6 with broad, shallow emargination; metasomal pubes-

- cence all blackish. *Leioproctus* s. str.
- . Gonocoxite (or coxal part of gonoforceps) hairless; gonobase one third as long as gonoforceps or less; apex of S6 with the usual small, v-shaped (sometimes shallow) median emargination; metasoma with some or all hair pale, usually forming apical tergal bands. 10
10. Labrum three times as wide as long, apical margin broadly emarginate. *Chilicolletes*
- . Labrum little over twice as wide as long, apical margin convex or with small median emargination. *Sarocolletes*
11. Inner hind tibial spur finely pectinate (almost ciliate) with over 25 teeth. *Leioproctus* s. str.
- . Inner hind tibial spur strongly pectinate with less than 10 teeth 12
12. S2-4 with apical bands of sparse, simple hairs not hiding surfaces of sterna. *Chilicolletes*
- . S2-4 with apical bands of long dense hairs forming a ventral scopa that partially hides surfaces of sterna 13
13. Tibial and sternal scopal hairs with numerous short, fine branches projecting laterally from rachis (as in Fig. 19e) *Sarocolletes*
- . Tibial scopal hairs dividing to form few major branches; sternal scopal hairs simple *Hoplocolletes*
14. Mandible of male simple; labrum about six times as wide as long, in female with apicolateral lobe bearing part of marginal fringe of bristles 15
- . Mandible of male with preapical tooth on upper margin, as in female; labrum two to five times as wide as long, without apicolateral lobe 16
15. Glossal lobes not much longer than basal width; scopal hairs of tibia and sterna with numerous short, fine branches; clypeal margin unmodified, truncate. *Protodiscelis*
- . Glossa deeply divided, lobes elongate, seven to ten times longer than basal width; scopal hairs of tibia and sterna simple or those of tibia with a few major branches; clypeal margin of male with short median lobe overhanging base of labrum. *Tetraglossula*
16. Glossa deeply bifid, lobes about five times as long as basal width *Glossopasiphae*
- . Glossal lobes short, not much longer than basal width 17
17. Labial palpus six- or seven-segmented, longer than maxillary palpus; hind tibia of male with strong carina from apex of basitibial plate to apex of tibia *Hexanthes*
- . Labial palpus four-segmented, usually shorter than maxillary palpus; hind tibia of male without longitudinal carina, rarely with weak carina arising behind apex of basitibial plate. 18
18. S2-5 of female covered with short, unbranched, erect hairs that are enlarged and curved posteriorly at tips and of uniform length except longer on S2; pygidial plate of male defined, at least posterior end limited by carina; hind tarsus of male elongate, segment 2 well over three times as long as broad *Pygopasiphae*
- . S2-5 of female with broad apical bands of relatively long, simple or branched hairs; T7 of male with pygidial area indicated only by lack of hairs (except large and somewhat defined in *Kylopasiphae*); hind tarsus of male not especially elongate, segment 2 less than three times as long as greatest breadth 19
19. Females 20
- . Males. 24
20. Tibial and sternal scopal hairs with numerous short, fine side branches projecting at right angles to rachis or curled basad *Sarocolletes*
- . Tibial scopal hairs with long branches directed distad; sternum with hairs simple or with branches directed distad 21
21. Inner hind tibial spur coarsely pectinate with 10 teeth or less. 22
- . Inner hind tibial spur ciliate or finely pectinate with over a dozen teeth 23
22. Scopa of hind tibia formed around

- tibia without long, loose hairs extending above and below; basitibial plate with carinate margins not hidden by hair. *Perditomorpha* (part)
- Hind tibia with a few long, loose hairs fully half as long as tibia on upper and lower margins; basitibial plate hidden by hair except sometimes at base *Kylopasiphae*
23. Inner hind tibial spur finely pectinate; claws simple or with inner ramus reduced to small tooth, shorter than basal diameter of outer ramus. Body metallic blue or greenish *Spinolapis*
- Inner hind tibial spur ciliate; inner ramus of claw strong, longer than basal diameter of outer ramus, so that claws are bifid. Body without metallic coloration *Perditomorpha* (part)
24. T7 with shiny, hairless, irregularly rough pygidial area, not narrowed posteriorly, defined across posterior border by weak carina, this area occupying much of dorsum of tergum; S7 with apical lobes much reduced, in a single plane (Fig. 5c) *Kylopasiphae*
- T7 with dull or shiny, usually ill-defined pygidial area, sometimes a longitudinal strip, sometimes a broader area narrowed posteriorly; S7 with well developed apical lobes, two to four, usually at two levels, on each side. 25
25. Body metallic bluish or greenish; margin of S6 produced midapically as rounded hairy lobe about one third as wide as sternum, notched medially *Spinolapis*
- Body almost always nonmetallic; margin of S6 broadly rounded with median notch, often broad and shallow 26
26. Metasoma rather broad and flattened, resembling that of female in shape *Sarocolletes*
- Metasoma commonly rather slender, not flattened, usually distinctly different in shape from that of female *Perditomorpha*

Subgenus *Perditomorpha* Ashmead

- Perditomorpha* Ashmead, 1899:86; Moure, 1954:165.
Type species: *Perditomorpha bruneri* Ashmead, 1899 (monobasic).
- Bicolletes* Friese, 1908:11; Moure, 1954:170. Type species: *Bicolletes neotropica* Friese, 1908, by designation of Cockerell, 1915:342.
- Edwynia* Moure, 1951:195 (not Aldrich, 1930) (new synonym). Type species: *Pasiphae flavicornis* Spinola, 1851, by original designation.
- Edwyniana* Moure, 1954:165 (new name for *Edwynia*) (new synonym). Type species: *Pasiphae flavicornis* Spinola, 1851 (autobasic).
- Belopria* Moure, 1956:305 (new synonym). Type species: *Belopria zonata* Moure, 1956.
- Leioproctus* (*Bicolletes*, *Belopria*, *Edwyniana* and *Perditomorpha*); Michener, 1965:41.

This is the largest South American subgenus of *Leioproctus*. Because it is common, its characters are described in detail and other subgenera are mostly characterized by comparison to the usual (rather than exceptional) features of *Perditomorpha*. (Figs. 2, 3, 10a, b, e, 19a, b; Figs. 1-6, Moure, 1954; Figs. 1-3, Moure, 1956; Figs. 1-6, Toro, 1968; Figs. 1-9, Toro and Rojas, 1970; Figs. 121-126, Toro, 1973b).

Description: a. Integument black, nonmetallic or sometimes with barely perceptible bluish tint, metasoma sometimes red (blue in a rather large, undescribed Argentine species). Length 5-13 mm. Pubescence all pale to all black, pale haired species usually with weak apical bands of pale hairs on terga. b. Inner orbits converging below. c. Clypeus usually rather uniformly punctured and hairy but sometimes largely hairless medially (as in male *L. ruber*) or nearly all smooth and shining (as in *L. stilborhinus*) or sometimes with lower and lateral parts sparsely punctate and shining, upper central part flat and closely punctate, suggesting *Lonchopria* (*Biglossa*) and its relatives (as in *L. mourei* and females of *L. herrerae*, *nitidior*, *flavicornis*, and weakly in *L. tristis*). d. Labrum of both sexes over three times as wide as long (often five times), apical margin straight, weakly convex, or weakly concave, apical bristles usually longer than labrum; nearly whole surface or at least basal two fifths forming elevated, convex bare zone so that distal depressed zone is usually narrow but sometimes wider than elevated basal zone; apicolateral lobe absent (illustrated by Toro, 1973b, for *L. flavitarsis*). e. Maxillary palpus usually long, about last three segments beyond apex of galea; in *L. iheringi* and *ruber* only one or two segments beyond apex of galea, and in *L. arnavellus*, *bruneri*, *chrysostomus*, *inconspicuus*, and *leucostomus* palpus scarcely attaining apex of galea. Mandible with preapical tooth on upper margin in both sexes (illustrated by Toro, 1973b, for *L. flavitarsis*). Glossa with lobes usually broader than long, sometimes about as broad as long. f. Ocelli near summit of vertex,

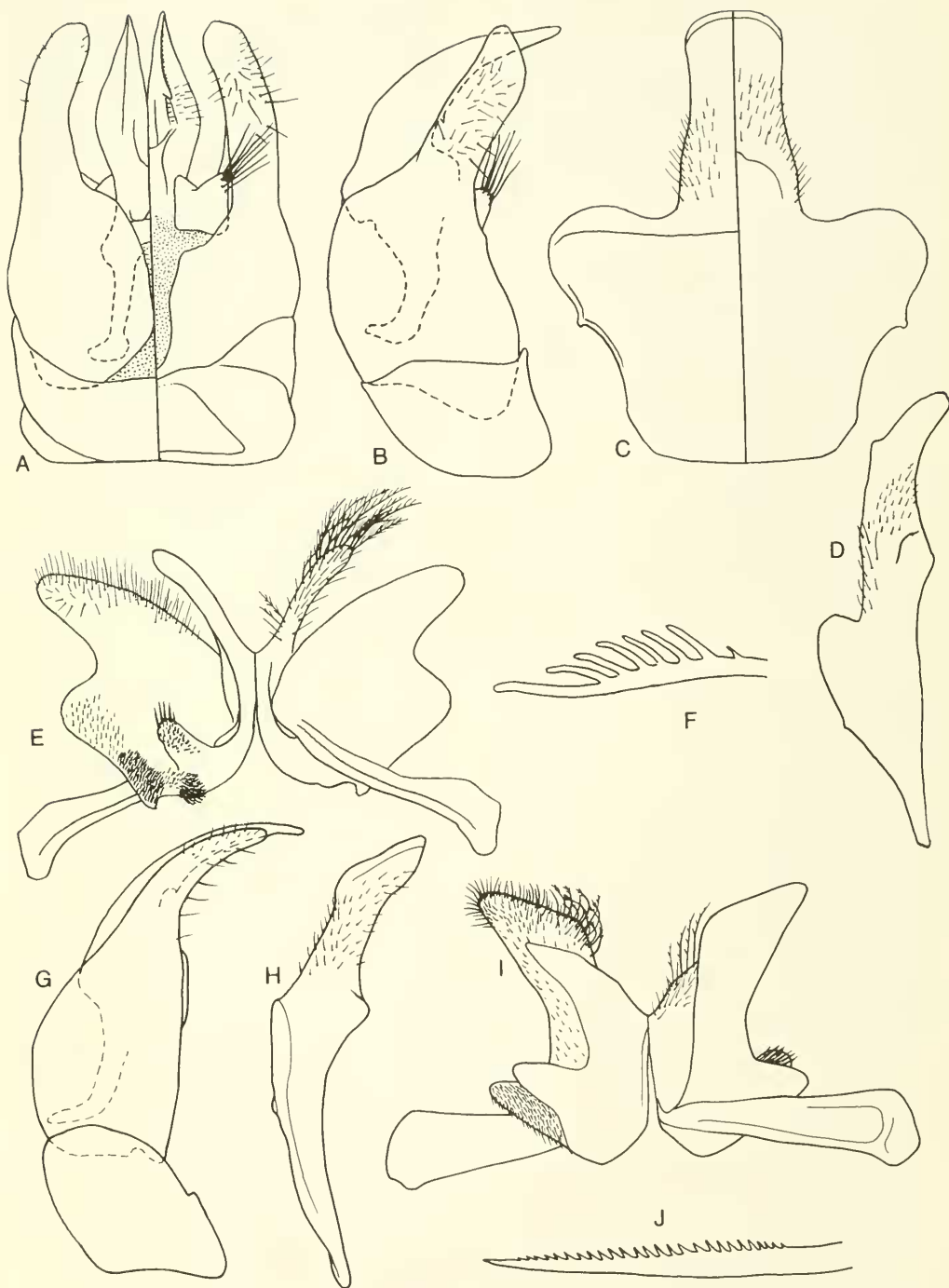


FIG. 3. a-f. *Leioproctus (Perditomorpha) inconspicuus* n. sp., male genitalia, S8 and S7; female inner hind tibial spur. g-j. *L. (P.) brunerii* (Ashmead), male genitalia and S8 (lateral views), S7; female inner hind tibial spur.

leucostomus, see discussion below). k. Tibial spurs straight, inner margin of inner spur of female pectinate (Fig. 3f), ciliate in *L. arnauellus* and *bruneri* (Fig. 3j), other margins ciliate (see illustration of *L. flavitarsis*, Toro, 1973b). l. Wings with minute hairs throughout or sometimes basal half or more hairless (as in *L. neotropicus* and *stilborhinus*); two submarginal cells, cell 2+3 subequal to 1; basal vein of forewing meeting or beyond cu-v; jugal lobe of hind wing usually reaching but sometimes not reaching or exceeding level of cu-v, in *L. neotropicus* and *stilborhinus* attaining midpoint between level of cu-v and apex of vannal lobe (as in *Kylopasiphæ*). m. Sterna of female without well developed scopa but with apical bands of long hair (sometimes with pollen and functionally a scopa), hair suberect or sloping posteriorly, shorter than exposed parts of sterna, usually dense in band across posterior part of each sternum but sometimes sparse as in *L. flavitarsis* and *mourei*, usually simple or with only a few plumose hairs on median basal or on lateral part of each band, but sometimes coarsely branched as in *L. iheringi*, *saltensis*, and *neotropicus*; in *L. arnauellus*, *bruneri*, and *inconspicuus* sternal scopa moderately developed, hairs with numerous rather short side branches, mostly directed apical. S6 of male unmodified, ordinarily with small apical emargination. Pygidial plate of male absent but T7 with median, often flattened, sparsely hairy or bare area (convex and bare, sharply different from adjacent areas, in *L. zonatus*). n. S7, S8, and genitalia of male as illustrated by Moure (1954), Toro and Rojas (1970) and for *L. zonatus* by Moure (1956) and *L. flavitarsis* by Toro (1973b), and in Figures 2 and 3 herein. Apicolateral lobes of S7 of the male two on each side, usually both broad and more or less rounded (Moure, 1954; Toro and Rojas, 1970; Toro, 1973b; Fig. 2f); lobes sometimes narrower and elongate, e.g. in *L. mourei* (Toro, 1968) and *zonatus* (Moure, 1956) or rather small and one somewhat elongate, e.g. *L. herrerae* (Toro, 1968), or broadened and extended basally, each bilobed so that there are four apicolateral lobes on each side in *arnauellus* and *bruneri* (Fig. 3). Process of S8 little downcurved; distal part of gonoforceps broad so that there is no stylus-like structure when viewed from above or below although slender distally in lateral view, under surface near apex with ill-defined membranous area.

Distribution: This large subgenus is abundant in temperate South America on both sides of the Andes and ranges north to Peru and the state of Ceará, Brazil.

Included species: (*marks species not seen by me): *Leioproctus* (*Perditomorpha*) *abdominis* Michener, 1965 (= *Pasiphæ abdominalis* Jörgensen, 1912, preoccupied in *Leioproctus*); **alismaticus* (Ducke, 1908) [*Panurginus*]; **andinus* (Herbst, 1923) [*Pasiphæ*]; *arnauellus* Michener, named in the Appendix (= *Perditomorpha arnaui* Moure, 1954, preoccupied in *Leioproctus*); *atacama* Toro & Rojas, 1970; **basi-*

rufus (Schrottky, 1920) [*Pasiphæ*]; *bicellularis* (Ducke, 1910) [*Lonchopria*]; *bruneri* (Ashmead, 1899) [= *Pasiphæ leaena* (Vachal, 1909)]; *chrysostomus* (Cockerell, 1917) [*Pasiphæ*]; **coloratipes* (Cockerell, 1933) [*Pasiphæ*]; **decoloratus* (Ducke, 1908) [*Panurginus*]; *erithrogaster* Toro & Rojas, 1970; *eulonchopriodes* Michener n. sp.; **fasciatus* (Schrottky, 1920) [*Pasiphæ*]; **ferrugineus* (Moure, 1954) [*Bicolletes*]; *flavicornis* (Spinola, 1851) [*Pasiphæ*]; *flavitarsus* Toro, 1973; **franki* (Friese, 1908) [*Bicolletes*]; **friesei* (Jörgensen, 1912) [*Pasiphæ*]; *herrerae* Toro, 1968; *iheringi* (Schrottky, 1910) [*Pasiphæ*] (= *Pasiphæ cestri* Ducke, 1912); *inconspicuus* Michener n. sp.; *leucostomus* (Cockerell, 1917) [*Pasiphæ*]; **longipes* (Jörgensen, 1912) [*Pasiphæ*]; *lucidulus* (Cockerell, 1933) [*Pasiphæ*]; **moerens* (Vachal, 1909) [*Pasiphæ*]; *mourei* Toro, 1968; *neotropicus* (Friese, 1908) [*Bicolletes*]; *nitidior* (Moure, 1956) [*Belopria*]; **paraguayensis* (Schrottky, 1907) [*Perditomorpha*]; *penai* Toro & Rojas, 1970; *perezi* Toro & Rojas, 1970; *peruvianus* (Cockerell, 1926) [*Pasiphæ*]; *pharacidodes* (Moure, 1954) [*Bicolletes*]; *pseudozonatus* (Moure, 1954) [*Bicolletes*]; *ruber* Toro & Rojas, 1970; *rufiventris* (Spinola, 1851) [*Pasiphæ*]; *saltensis* (Friese, 1908) [*Bicolletes*]; **seydi* (Strand, 1910) [*Bicolletes*]; **spiegazzinii* (Jörgensen, 1912) [*Calloipsis*]; **stictus* (Moure, 1954) [*Bicolletes*]; *stilborhinus* (Moure, 1954) [*Bicolletes*]; *tristis* (Spinola, 1851) [*Pasiphæ*]; *wagenknechti* Toro & Rojas, 1970; *zonatus* (Moure, 1956) [*Belopria*].

Comments: In spite of the name of this subgenus, there is no resemblance to the panurgine genus *Perdita*. The following characters that are often of subgeneric or generic importance in bees vary within the subgenus:

Facial foveae of females are usually completely absent or represented only by areas that are less densely punctate or slightly more shiny than surrounding regions. However, the foveae are distinct, well defined, and depressed in females of *L. herrerae* and *tristis*.

Certain species are very coarsely punctate, unlike most species which are only moderately to finely punctate. One of the most coarsely punctate is *L. iheringi*. It also has the basal, subhorizontal part of the propodeum as seen in profile, slanting and unusually short, only about half as long as the metanotum, and the margin of the propodeal triangle marked by a row of strong pits. *L. eulonchopriodes* is similarly coarsely punctate, with yellow apical integumental bands on T1, 3, and 4, and with the apical tergal margins upturned and carinate as in *Eulonchopria psathyroides*. *L. lucidulus* is intermediate in coarseness of punctuation between *L. iheringi* and ordinary species.

Unusual features of certain other species are as follows: In *L. stilborhinus* the front tarsus of the

female is only about as long as the tibia, the basitarsus is particularly shortened, bristled apically, with a flat, hairless translucent apical process extending distad about to the apex of segment 3. In *L. neotropicus* (or a close relative) the lines marginating the propodeal triangle are evanescent, so that the triangle, which is so clearly defined in most colletids, is often difficult to recognize. In *L. chrysostomus* the claws of each leg are asymmetrical, the principal ramus of the inner claw being enlarged and blunt.

The species that have been placed in *Edwyniana* are diverse. The type species, *L. flavicornis*, and *L. herrerae* are similar in being rather large, with strong apical bands of often erect white hair on T2-4, and with red legs. In these respects they differ from the other species placed in *Edwyniana*, *L. mourei* and *tristis*, which look like ordinary *Perditomorpha*. I can recognize no characters that justify separation of *Edwyniana* from the *Bicolletes* sort of *Perditomorpha*. Toro and Rojas (1970) already noted problems in the recognition of *Edwyniana*, some characters of *L. erithrogaster*, a rather ordinary looking *Perditomorpha*, being those attributed to *Edwyniana*.

The species that have been placed in *Belopria* (*L. zonatus*, *nitidior*) are slightly more distinctive and obviously closely related to one another. Both have the subhorizontal basal part of the propodeum steeply sloping and very short, so that the profile of the propodeum is almost wholly declivous. The same is true of *L. mourei* and is approached by *L. iheringi*. More noteworthy is the scopa which is better developed on the hind femora and trochanters than in any other *Perditomorpha*. Furthermore, the pygidial area of the male is represented by a convex bare area, narrowly rounded at the apex. Although not margined it is better developed than in other *Perditomorpha*. On the basis of these characters, *Belopria* could be recognized as a subgenus but it would be weakly differentiated compared to other subgenera and I have therefore chosen to place its species in *Perditomorpha*.

The subgenus *Perditomorpha* in the old sense contains only two previously described species (*L. arnaeuellus*, *brunerii*) that have long been separated from *Bicolletes* at the generic or subgeneric level (Moure, 1954; Michener, 1965). It no longer seems practical to maintain the distinction between *Bicolletes* and *Perditomorpha*, even at the subgeneric level. The following are the distinctive features of the two species listed above, lettered as in the subgeneric descriptions: g. Flagellum of both sexes very short, not over twice as long as scape, not attaining tegula, middle segments much broader than long. j. Scopal hairs on anterior side of femoral corbicula and on outer

side of hind tibia plumose with branches along rachis (Fig. 19b). k. Margins of tibial spurs ciliate (Fig. 3j). m. Sternal hairs long, forming moderately distinct metasomal scopa, with numerous rather short, fine branches. n. S7 of male with lateroapical lobes large, each bilobed so that there are four lobes on each side, two of them extending far basally and two apically, apodemes extending laterally in opposite directions (Fig. 3i).

In the features listed above, *L. inconspicuus* agrees with *Perditomorpha* in the old sense except for the hind tibial spur (k) which is coarsely pectinate in the female, as in typical *Bicolletes* (Fig. 3f). Also the emargination between two of the lobes of S7 of the male is less deep, although the sternum is of the same type as that of *Perditomorpha* in the old sense (Fig. 3e).

L. leucostomus occupies a more clearly intermediate position between the old *Perditomorpha* and *Bicolletes*, and indeed has been placed at different times in each group. The scopal hairs of the hind leg (j) are like those of *Perditomorpha* in the old sense or those of the tibia with somewhat longer branches. The sternal scopa (m), however, is scarcely developed and the hairs are simple or with long branches, i.e., as in *Bicolletes*. The inner hind tibial spur of the female is pectinate but finely so, with about ten teeth, thus deviating from the ordinary coarsely pectinate type (with five or six teeth) in the direction of the old *Perditomorpha*. The flagellum of the male (g) is more elongate than in the old *Perditomorpha*. S7 of the male (n) has the two apicolateral lobes on each side large and extended basad but not divided into more lobes (Fig. 2g), thus intermediate between *Bicolletes* and the old *Perditomorpha*, but as in the latter, the apodemes extend laterally in opposite directions. *L. leucostomus* also differs from the old *Perditomorpha* in some less decisive characters (because they vary within *Bicolletes*) as follows: anterior ocellus well behind midpoint between antennal bases and posterior margin of vertex; basitibial plate rounded at apex, especially in female.

J. L. Neff (in litt.) has noted that *Perditomorpha* in the old sense (*L. arnaeuellus*, *brunerii*, and *inconspicuus*) seems to specialize in collecting pollen from Malvaceae, and the coarse pollen on specimens in collections supports this view. Specimens of *L. leucostomus*, however, have much finer pollen.

The correct position of *L. bicellularis* is in doubt although it is listed above as a *Perditomorpha*. It has strong apical enamel-like pale yellow bands on T1-4 of the female and T1-5 of the male, suggesting the subgenus *Nomiocolletes*, but does not resemble that subgenus in other features. Similar bands but on fewer terga are found on *L. (Perdito-*

morpha) *eulonchopriodes*, but the bands of *L. bicellularis* are flat and smooth, not upturned and carinate at the margins, and the body is not especially coarsely punctate as in *L. eulonchopriodes*. Features that do not agree with other *Perditomorpha* include the middle flagellar segments of the male which are fully 1.25 times as long as wide; the scopal hairs are as noted for *L. (P.) leucostomus* and *Perditomorpha* s. str. The claws of the female have the inner ramus reduced to a minute tooth so that they are almost simple; in the male the inner ramus is much smaller than usual. Unfortunately the only male of *L. bicellularis* seen [AMNH] lacks the apex of the metasoma so that the genitalia and hidden sterna remain unknown.

Chilicolletes new subgenus

Type species: *Leioproctus delahozii* Toro, 1973.

This subgenus closely resembles *Perditomorpha* but has three submarginal cells. It differs from *Sarocolletes* by the very different scopal hairs of the latter, and from American *Leioproctus* s. str. by the coarsely pectinate inner hind tibial spur of the female. (Figs. 4, 10c; Figs. 127-135, Toro, 1973b).

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Length 7-11 mm. Pubescence largely dusky, if with considerable pale hair, then usually with tergal hair bands. d. Labrum of male three times, of female over three times, as wide as long; apical margin gently concave (figures in Toro, 1973b). e. Maxillary palpus with

about 2.5 segments beyond apex of galea. g. Male flagellum scarcely reaching tegula, middle segments slightly broader than long. h. Propodeum with subhorizontal zone about as long as metanotum; groove margining triangle weakly pitted or not pitted. i. Anterior basitarsus of female with weakly evident row of hairs along outer margin. j. Hairs along posterior margin of femoral corbicula with several short barbs. Hairs of tibial scopa with several long branches as in most *Perditomorpha* but with one (the rachis) distinctly longer than others. l. Wings with parts of basal cells hairless. *Three submarginal cells*, 2 much shorter than 3 and receiving first recurrent vein near middle or at distal end. m. Sternal scopa sparse, longer hairs almost as long as exposed part of sternum, simple or nearly so. T7 of male with large, bare, shining somewhat convex area, narrowed posteriorly, sharply defined by absence of hairs. n. S7, S8, and genitalia illustrated by Toro (1973b) and Fig. 4. S7 with apicolateral lobes elongate, unlike most *Perditomorpha*.

Distribution: Central Chile.

Included species: *Leioproctus (Chilicolletes) delahozii* Toro (1973) and at least one related undescribed species.

Comments: This subgenus is related to *Perditomorpha* and my first inclination was to include it in that subgenus in spite of the three submarginal cells. However, presence of a comb of hairs on the anterior basitarsus of the female is also unlike any *Perditomorpha*. This weakly developed comb, however, is not like that of *Nomiocolletes*, *Reedapis*, and *Cephalocolletes*. Instead it seems to be merely the abrupt line ending the vestiture of long hairs on the upper surface of the basitarsus, the lower

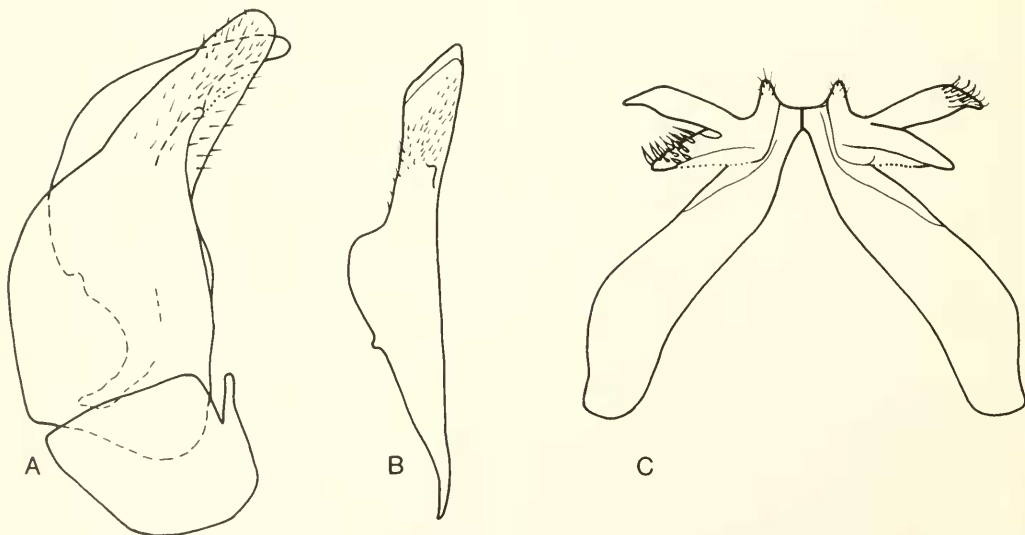


FIG. 4. a-c. *Leioproctus (Chilicolletes) delahozii* Toro, male, lateral views of genitalia and S8, dorsal and ventral views of S7.

surface being nearly bare, unlike other species. The other characters listed above are within the range of variation found in *Perditomorpha*. The trochanteral and femoral scopas are better developed than in most *Perditomorpha*. The presence of three submarginal cells suggests that this might be a surviving representative of the group from which *Perditomorpha* was derived. It cannot be a specialized derivative of *Perditomorpha* like the little groups here included in that subgenus, such as *Edwyniana*, *Belopria*, and *Perditomorpha* s. str.

Etymology: The subgeneric name is based on Chile, the country where these bees occur, and the generic name *Colletes*.

Kylopasiphae new subgenus

Type species: *Leioproctus* (*Kylopasiphae*) *pruinus* new species.

This subgenus is similar to *Perditomorpha*. The greatly reduced lobes of S7 of the male are the most distinctive feature; others include the hidden basitibial plate and the features of the tibial scopa of the female (see below). The long antennae of the male also differentiate this subgenus from *Perditomorpha*; the short antenna of *Perditomorpha* is likely to be a derived feature uniting species of that subgenus. (Figs. 5a-f, 10f, 23e)

Description: Agreeing with usual (rather than exceptional) characters of *Perditomorpha* except as follows: a. Length 7-8.5 mm. Pubescence all pale, covering metasomal terga which lack apical hair bands or have weak bands in male. c. *Clypeus shiny and impunctate* except for lateral extremities and longitudinal median punctate depression; male with band of punctures across upper margin. d. Labrum about three times as wide as long; apical margin gently convex; basal two thirds shining, convex; female with transverse carina before depressed apical zone which lacks short hairs before apical fringe; longest apical bristles about as long as labrum in male, little longer in female; apicolateral lobe absent. g. *Male flagellum reaching beyond tegula, middle segments slightly over 1.5 times as long as broad*. h. Propodeum with subhorizontal surface 1.5 times as long as metanotum, not much sloping; propodeal triangle smooth, shining; marginal groove not conspicuously pitted, evanescent in female [as in *L. (Perditomorpha) neotropicus*]. i. *Basitibial plate of female small, hidden by hair* (even margin invisible without removing hair) except at base, that of male nearly hairless. j. Scopa rather dense. Hairs of trochanter and in front of femoral corbicula with several long branches directed apicad, most hairs with rachis exceeding branches (suggesting tibial scopal hairs of *Leioproctus* s. str., Fig. 19c). Hairs behind femoral corbicula abundant, mostly simple, a few branched ones near base of femur. Tibia on both lower and upper margins with a few extremely long (half as long as tibia or more), loose, hairs

(Fig. 23e) with short branches directed apicad, these hairs extending as far below as above tibia; hairs on outer side of tibia like those of most *Perditomorpha* (Fig. 19a) but near margins grading through types like those illustrated for *Leioproctus* s. str. and *Perditomorpha* s. str. (Fig. 19b, c) to very long hairs; hairs of lower margin not strongly curved upward. l. Forewing almost hairless except for short hairs beyond venation and in distal part of marginal cell. Jugal lobe of hind wing extending to point half way between vein cu-v and apex of vannal lobe. n. *S7 of male with apical lobes greatly reduced*, not layered one above another but all on a single plane (Fig. 5e); S8 and genitalia as in Fig. 5a-d.

Distribution: Argentina, desert areas in the provinces of Tucumán, Catamarca, La Rioja, and Neuquén.

Included species: *Leioproctus* (*Kylopasiphae*) *pruinus* Michener, n. sp.

Comments: This subgenus may be a derivative of some of the group of small species of *Perditomorpha* found in the same region. The relatively long jugal lobe of the hind wing suggests *L. (P.) neotropicus* and *stillborhinus*; the largely smooth female clypeus and supraclypeal area suggest the latter, and the near absence of the lines delimiting the propodeal triangle of the female suggest the former.

Etymology: The subgeneric name is based on the Greek *kylon*, face below the eyes, with reference to the shining clypeus, and *Pasiphae*, an unused generic name for Paracolletinae with two submarginal cells (see *Spinolapis*).

Subgenus *Leioproctus* Smith, s. str.

Leioproctus Smith, 1853:8; Michener, 1965:39. Type species: *Leioproctus imitatus* Smith, 1853, by designation of Cockerell, 1905a:348.

Lamprocolletes Smith, 1853:10. Type species: *Andrena chalybeata* Erickson, 1851, by designation of Cockerell, 1905a:344.

Dasycolletes Smith, 1853:14. Type species: *Dasycolletes metallicus* Smith, 1853, by designation of Cockerell, 1905a:347.

The comments and description below are based entirely on the single American species provisionally assigned to this subgenus and are not intended to encompass the variation exhibited by the many species in the Australian region. The three submarginal cells, the apical lobes of S7 of the male and the short, robust process of the male S8 are suggestive of *L. (Chilicolletes) delahozii*. The ciliate inner hind tibial spur, the longer male antennae, and other characters italicized below distinguish our species of *Leioproctus* s. str. from *Chilicolletes* and *Perditomorpha*. (Figs. 5g-l, 19c)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha*

except as follows: a. Length 10-11 mm. Pubescence largely dark but fulvous on dorsum of thorax; tergal hair bands absent. c. Clypeus with irregularly defined, narrow preapical zone shining and largely impunctate, especially in female. d. Labrum of both sexes four or more times as

wide as long, apex gently convex, basal half elevated, convex, bare, shining, in male medially lower; depressed distal zone and distal slope of elevated zone with small hairs basal to fringe. g. Male flagellum reaching beyond tegula. h. Propodeum with subhorizontal surface a little shorter

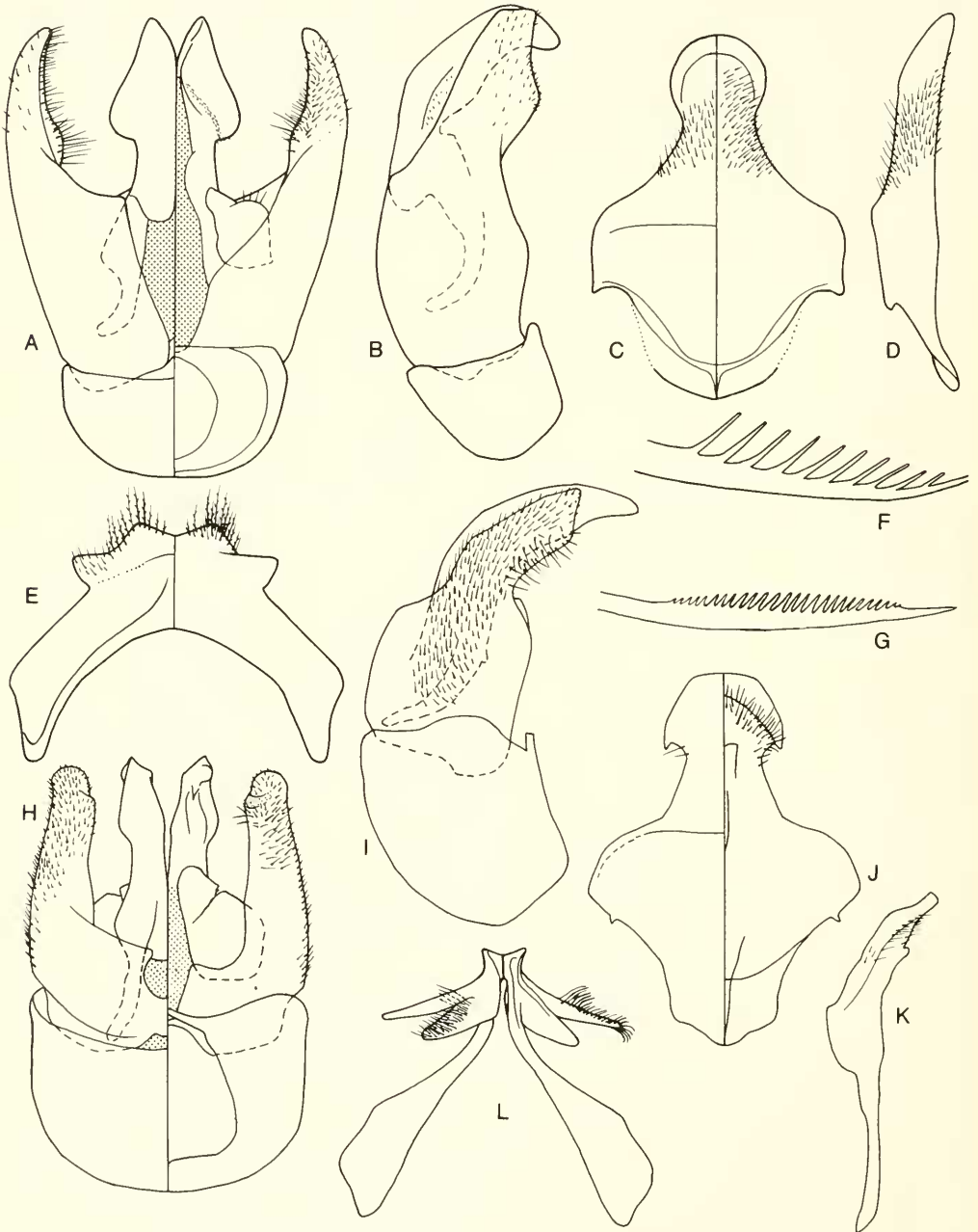


FIG. 5. a-f. *Leioproctus* (*Kylopasiphae*) *pruinosus* n. sp. Genitalia, S8 and S7 of male, inner hind tibial spur of female. g-l. *L. (Leioproctus) fulvoniger* n. sp. Inner hind tibial spur of female and genitalia, S8 and S7 of male.

than metanotum, sloping rather steeply; triangle dull, transversely striate; marginal line pitted especially anteriorly. i. Basitibial plate of female pointed, of male narrowly rounded. j. Hairs of femoral scopa black, rather short, straight, those on anterior side of corbicula with a few rather long branches diverging from rachis, thus similar to but smaller than tibial scopal hairs; on posterior side of corbicula hairs simple. Tibial scopa sparse, black, *long hairs of lower margin not much curved, thus scopa spreads as far below tibia as above it, branches of these hairs of moderate length, rather few in number, rachis of hair extending beyond branches* (Fig. 19c). k. *Margins of tibial spurs ciliate*. l. *Three submarginal cells, 2 much shorter than 3 and receiving first recurrent vein beyond middle; basal vein distal to cu-v*. m. Sterna of female with abundant hair sloping posteriorly, shorter than usual in *Perditomorpha*, not much over half length of exposed part of sternum. n. S7, S8, and genitalia as in Fig. 5h-l. Apical lobes of S7 rather slender, more or less as in *L. (Chilicolletes) delahozii*, not broad as in most *Perditomorpha*; S8 with apical process short and very robust; *gonobase enormous; gonocoxite with hairs nearly to base and with strong dorsal inner angle*.

Distribution: Santa Catarina, Brazil (and the Australian region).

Included species: *Leioproctus (Leioproctus) fulvignier* Michener, n. sp., and about 120 species in the Australian region.

Glossopasiphae new subgenus

Type species: *Leioproctus (Glossopasiphae) plaumanni* new species.

The most distinctive character of this subgenus is the two long glossal lobes which resemble those of the subgenus *Tetraglossula*. However, the structure must have evolved independently, for *Tetraglossula* belongs with *Protodiscelis* in a group having simple mandibles in the male and an extremely short labrum with lateroapical lobes at least in females. *Glossopasiphae*, however, like many *Leioproctus*, has bidentate male mandibles and a relatively long labrum without lateroapical lobes. (Figs. 6, 19d)

Description: Agreeing with usual (rather than exceptional) characters of *Perditomorpha* except as follows: a. Length 12-14 mm. Pubescence largely black or dusky except for thoracic dorsum; tergal hair bands absent. b. *Inner orbits very slightly diverging below* (both sexes), *almost without concave region* so that upper parts of orbits are not greatly different in orientation from remainder. d. Labrum of male about twice as broad as long, of female over 2.5 times as broad as long; *apex produced to rounded angle*; male with basal two fifths gently convex, convexity slightly depressed medially; female with basal three fifths strongly elevated and convex; apical bristles scarcely longer than labrum; apical four fifths of labrum punc-

tate, with hairs. e. *Glossa deeply bifid*, each lobe attenuate, hairy, about five times as long as basal width (Fig. 6h). Galea about as long as stipes, postpalpal part about six times as long as wide, not or slightly exceeded by maxillary palpus. f. Ocelli in front of summit of vertex; vertex convex and rounded behind ocelli; anterior margin of median ocellus in front of midpoint between antennal bases and posterior margin of vertex. g. Male flagellum not attaining tegula, middle flagellar segments slightly broader than long. h. Propodeum with basal zone steeply sloping in profile, shorter than metanotum; propodeal triangle transversely striate granulate, marginal groove not pitted. i. Basitibial plate rounded at apex, narrowly so in male. j. Femoral corbicula with a few short hairs on surface basally; scopa on anterior side of corbicula long, dense, hairs with many fine, short lateral branches as on tibial scopa; trochanteral hairs similar; hairs on posterior side of corbicula simple or toward base of femur with fine, short side branches. Tibial scopa dense, long, extending farther below tibia than above, hairs of lower margin gently curved apicad and slightly upward; *hairs with many fine, short branches at more or less right angles to rachis and often curved basad* (Fig. 19d), *rachis extending well beyond branches*. k. Tibial spurs gently curved near apices, *inner hind spur of female coarsely pectinate*, other margins coarsely ciliate. l. Basal vein of forewing meeting cu-v. m. *S2-5 of female with dense scopa* of hairs as long as exposed part of sternum, similar to those of tibial scopa. n. S7, S8, and genitalia of male as in Fig. 6. S8 with apical process not bent down, without ventral tubercle. Gonostylus fused to gonocoxite, with distal ventral membranous area.

Distribution: Santa Catarina, Brazil.

Included species: *Leioproctus (Glossopasiphae) plaumanni* Michener, n. sp.

Etymology: The subgeneric name is based on the Greek *glossa*, tongue, with reference to the elongate glossa, plus *Pasiphae*, a generic name used for various paracolletines with two submarginal cells (see *Spinolapis*).

Sarocolletes new subgenus

Type species: *Lonchopria rufipennis* Cockerell, 1917.

The appearance of the scopal hairs, with numerous short fine side branches, is a striking feature of this subgenus shared only with *Glossopasiphae* and *Protodiscelis*. Most other characters agree with those of *Chilicolletes*, or in the case of two-celled species, with *Perditomorpha*. *Sarocolletes* differs further from those subgenera, however, in the well developed ventral scopa of the female and in the relatively broad metasoma of the male which therefore resembles a female. (Figs. 7a-h, 10g)

Description: Agreeing with usual (rather than

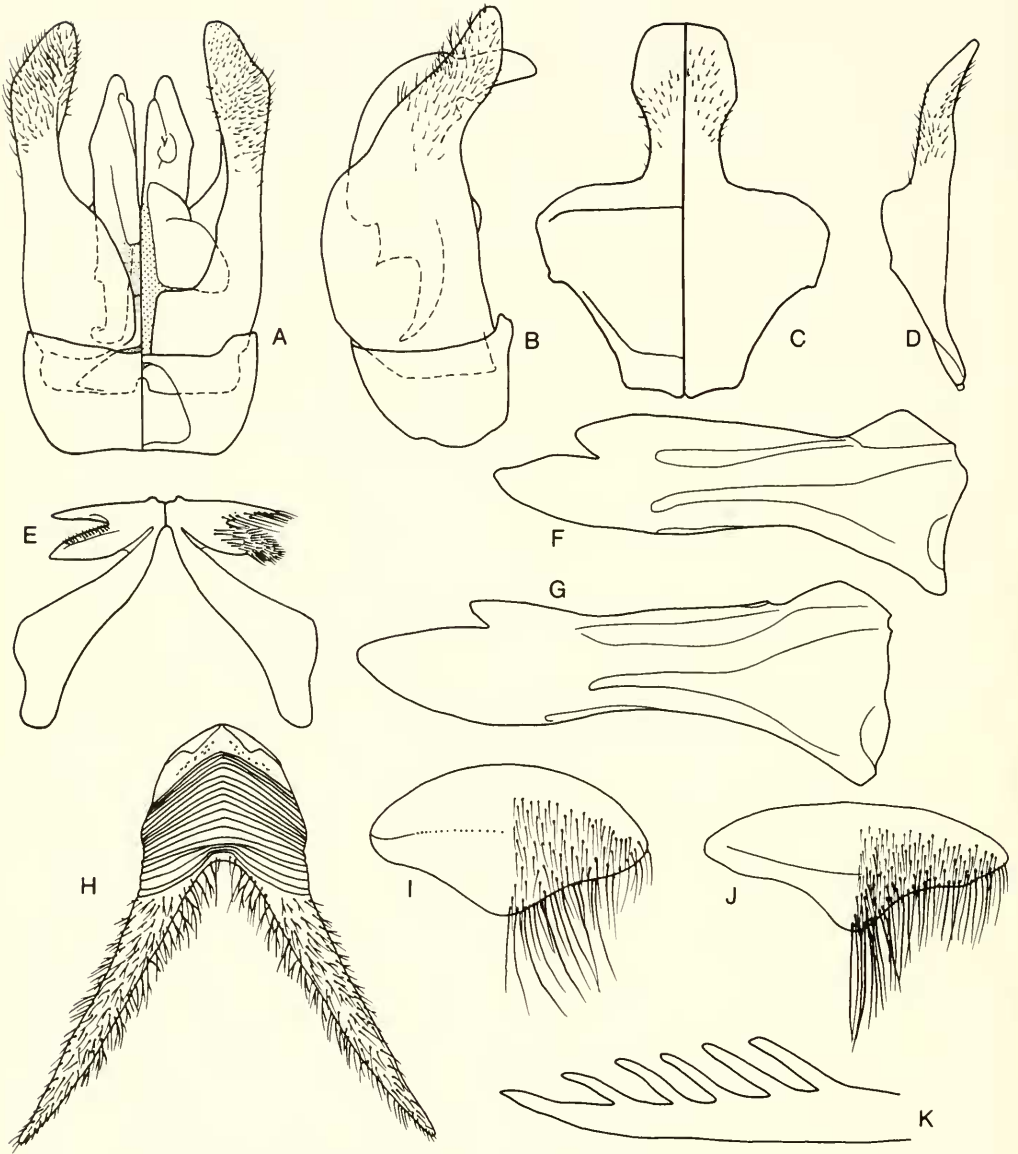


FIG. 6. *Leioproctus (Glossopasiphæ) plaumanni* n. sp. a-f. Genitalia, S8 and S7, and mandible of male. g, h. Mandible and glossa of female. i, j. Labrum of male and female. k. Inner hind tibial spur of female.

exceptional) characters listed for *Perditomorpha* except as follows: a. Length 7-11 mm. Pubescence mostly pale, forming apical bands of pale hair on terga. Metasoma of male broad so that body form is like that of female. b. Inner orbits only slightly converging below. d. Labrum two to three times as broad as long, apex gently convex or with small median concavity, apical bristles about as long as labrum; basal three fifths to four fifths a convex bare zone, more elevated in female

than male, this convexity weakly depressed medially. Maxillary palpus reaching little if any beyond apex of rather long galea, postpalpal part of which is as long as prepalpal part. f. Ocellar position variable as described for *Perditomorpha*. Vertex behind ocelli well developed, convex. g. Male flagellum sometimes, as in *L. (S.) rufipennis*, not reaching tegula, middle segments slightly broader than long to longer than broad. h. Propodeum variable as in *Perditomorpha*. i. Basitibial

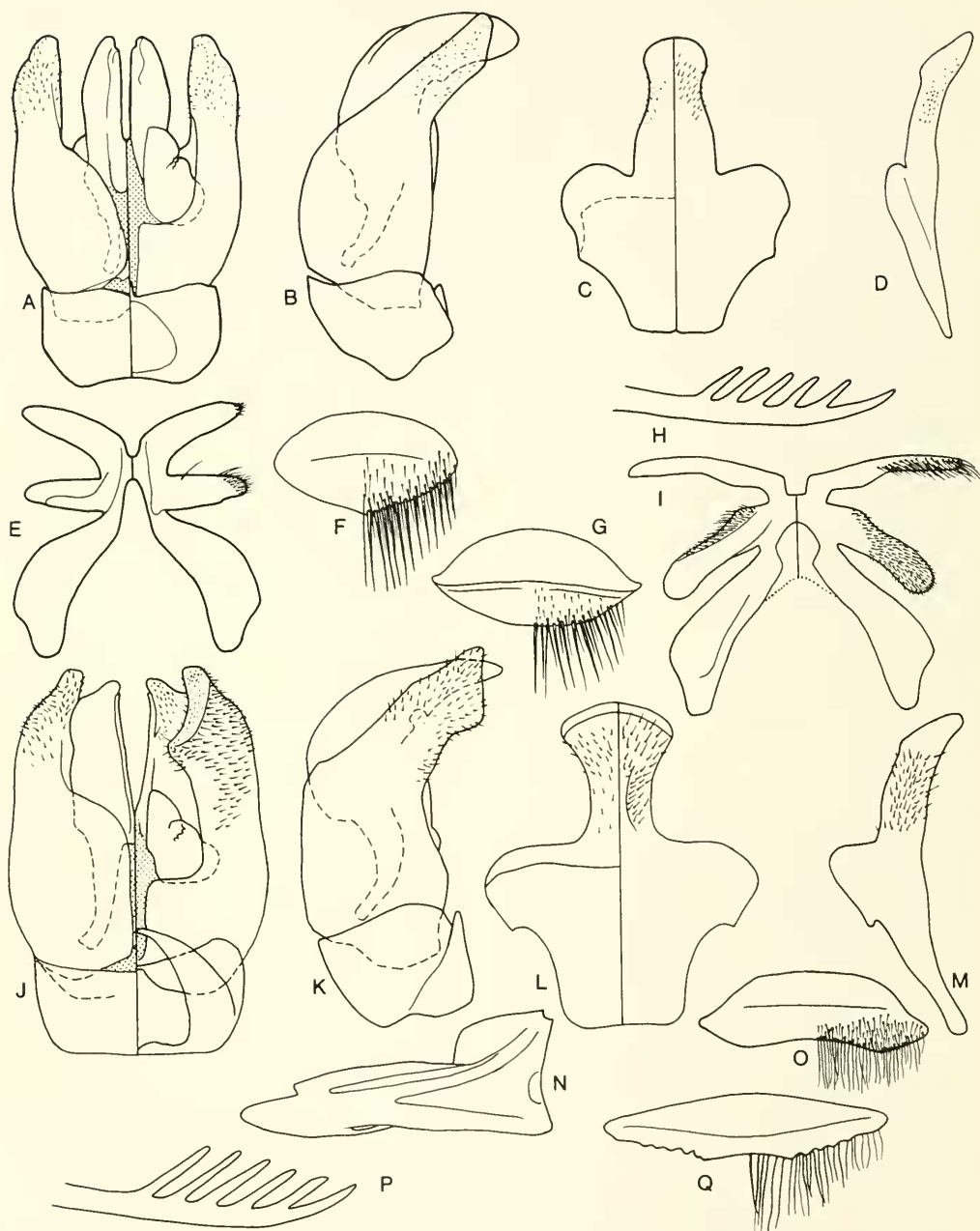


FIG. 7. a-h. *Leioproctus (Sarocolletes) duplex* n. sp. a-e. Genitalia, S8 and S7 of male. f, g. Labrum of male and female. h. Inner hind tibial spur of female. i-o. *L. (Holmbergeria) rubriventris* (Fries), male. i. S7. j-m. Genitalia and S8. n, o. Mandible and labrum. p, q. *L. (Hoplocolletes) ventralis* (Fries), female, inner hind tibial spur and labrum.

plate variable as in *Perditomorpha*, rounded in *L. (S.) rufipennis*. j. Femoral corbicula with a few short hairs on surface; hairs anterior to corbicula and on trochanter with numerous rather short, fine branches along rachis, often shorter than those on tibial scopal hairs; hairs posterior to corbicula simple. Tibial scopa with hairs of lower margin not curved upward, scopa extending farther below tibia than above, hairs of entire tibial scopa with numerous short, fine side branches along rachis similar to those illustrated for *L. (Protodiscelis) palpalis* (Fig. 19c). l. Wings usually with three submarginal cells, two only in *L. (S.) duplex*. m. S2-5 of female with strong scopa of long (as long as exposed part of sternum), dense, sloping hairs with numerous short, fine side branches that tend to be at right angles to rachis and curled basad, as on tibial hairs of *L. (Glossopasiphæ) plaumanni* (Fig. 19d). S7 of male with median bare area convex, tapering posteriorly, as in *L. (Perditomorpha) zonatus*. n. S7, S8, and male genitalia as shown in Fig. 7a-c. Lateroapical lobes of S7 rather slender, somewhat as in *L. (Chilicolletes) delahozii*, all in same plane; ventral projection of S8 extremely weak (Fig. 7d).

Distribution: Argentina, the provinces of Buenos Aires and Entre Rios to Tucumán, including Santiago del Estero, Santa Fe, Catamarca, and La Rioja.

Included species: *Leioproctus (Sarocolletes) rufipennis* (Cockerell, 1917) [*Lonchopria*] and its probable synonym, *parvus* (Cockerell, 1917), proposed as a variety of *rufipennis*. In addition, it contains at least five apparently undescribed species. All of the above have three submarginal cells. It also includes *L. (S.) duplex* Michener, n. sp., described in the Appendix, which is exceptional among species of *Sarocolletes* only in having two instead of three submarginal cells.

Comments: Padre J. S. Moure recognized the species with three submarginal cells as a group and named it with specimen labels before 1956. I have not accepted his name since it indicated a relationship to *Lonchopria*. The possibility that this subgenus is a synonym of *Holmbergeria* is discussed under that subgenus.

Etymology: The name *Sarocolletes* is based on the Greek *saron*, brush or broom, plus the generic name *Colletes*, with reference to the large ventral scopa in females of this subgenus.

Subgenus *Holmbergeria* Jörgensen

Holmbergeria Jörgensen, 1912:100. Type species: *Holmbergeria cristariae* Jörgensen, 1912 (monobasic).

This subgenus is known only from the male. When female characters are known, its relationships may be clarified. If the female scopa turns out to be like that of *Sarocolletes*, that subgenus might well be regarded as a synonym of

Holmbergeria in spite of the peculiar facial features (italicized below) of the males of the latter. (Figs. 7i-o, 10d)

Description: Agreeing with usual (rather than exceptional) characters of *Perditomorpha* except as follows: a. Metasoma sometimes partly red (T1-2 or 1-3). Length 9-11 mm. Pubescence pale, dusky on vertex and distal metasomal segments, with strong apical bands of pale hair on terga. b. Face broad, inner orbits parallel. c. Supraclypeal area small, convex, hairless, shining and impunctate; subantennal area shorter than diameter of antennal socket, flat, hairless, shining, impunctate, in contrast to rest of face which is punctate and hairy. d. Labrum about three times as wide as long; apical bristles mostly not longer than labrum; basal half elevated, smooth, shining; distal half with small hairs basal to apical bristles. e. Maxillary palpus with little more than last segment extending beyond apex of galea. f. Anterior margin of median ocellus at midpoint between antennal bases and posterior margin of vertex or nearer to the former; vertex strongly developed, convex. g. Flagellum reaching tegula or not, middle segments as long as broad or slightly longer than broad. h. Propodeum with subhorizontal surface (in profile) shorter than metanotum, rounding onto sloping (slanting) posterior surface; triangle smooth or feebly wrinkled, marginal line not pitted. i. Basitibial plate with apex rounded, surface hairy except at margins. k. Tibial spurs (male) with margins ciliate. l. Three submarginal cells, 2+3 about as long as 1, 2 shorter than 3, receiving first recurrent vein in apical half; jugal lobe of hind wing extending beyond level of cu-v. m. S6 (male) unmodified. Pygidial plate absent but with hairless longitudinal median bare area, narrowed toward posterior margin of tergum. n. S7, S8 and genitalia as in Fig. 7j-m. S7 with two slender apicolateral lobes; S8 with apical process not bent downward, without ventral protuberance but with longitudinal ridge in its place; membranous area at apex of gonostylus well defined.

Distribution: Argentina, provinces of Mendoza to Santiago del Estero; Paraguay.

Included species: *Leioproctus (Holmbergeria) cristariae* (Jörgensen, 1912) and *L. (H.) rubriventris* (Friese, 1909) [*Biglossa*]. These forms are morphologically very similar; the former has the legs and metasoma black, while the latter has the legs and first two or three metasomal terga red. (See Appendix for details on *L. cristariae*.)

Subgenus *Hoplocolletes* Michener

Leioproctus (Hoplocolletes) Michener, 1965:42. Type species: *Dasycolletes ventralis* Friese, 1924, by original designation.

This subgenus is recognized only on the basis of a combination of female characters most of which are duplicated in other *Leioproctus*. The combination of the characters found in *L. (Hoplocolletes) ventralis*, however, suggests a form quite

dissimilar to other subgenera; discovery of the male will, of course, greatly assist in placement of *Hoplocolletes*. (Fig. 7, p-q)

Description: Agreeing with usual (not exceptional) female characters listed for *Perditomorpha* except as follows: a. Length 12 mm. Pubescence short, sparse, blackish except on hind legs and metasomal sterna where there are long, pale hairs; metasomal hair bands absent. b. *Inner orbits subparallel*. d. Labrum with apical margin concave medially; elevated zone highest medially, occupying about basal half of labrum. f. Ocelli well forward so that anterior margin of median ocellus is nearer to antennal bases than to posterior margin of vertex. h. Propodeum with subhorizontal surface about as long as metanotum, triangle smooth, marginal line pitted. i. Basitibial plate rather slender, pointed. j. Femoral scopa sparse, *hairs in front of corbicula mostly simple or bifurcate*, those behind corbicula and on trochanter long but simple. Tibial scopa sparse but hairs long, those of lower margin curved apicad, branched as in *Perditomorpha*, but many hairs of outer and upper surfaces with main axes extending beyond the one or few long branches; scopa extending farther above tibia than below; hairs of inner surface of tibia as long as scopal hairs and thus not like keirotichia. l. Three submarginal cells, second much shorter than third and receiving recurrent vein beyond middle; basal vein of forewing slightly beyond cu-v. m. S3-5 with dense, long (shorter than exposed part of sternum), pale yellow, simple hairs (some hooked at tips) forming band occupying apical half of each sternum; S2 with similar but sparser hair band.

Distribution: Rio de Janeiro, Brazil.

Included species: *Leioproctus* (*Hoplocolletes*) *ventralis* (Friese, 1924).

Comments: The very coarsely punctate head and thorax of *Hoplocolletes* suggest *L. (Perditomorpha) iheringi* and *eulonchopriodes*, although the dorsum of the thorax is even more coarsely and less closely punctate. The metasoma, however, is nearly impunctate (T1-2) or finely punctate (T3, etc.) in *L. ventralis*, and the subparallel inner orbits, the three submarginal cells, the very deeply impressed median line of the anterior half of the scutum, the deeply impressed parapsidal lines, the simple hind trochanteral hairs, and the strong ventral scopa further differentiate *Hoplocolletes*. (A superficially similar black species known in both sexes, *L. (Tetraglossula) anthracinus* Michener n. sp., from the same area as *L. ventralis*, has been identified as that species in some collections.)

The only known species of this subgenus, *L. (H.) ventralis* (Friese), was described from Sydney, Australia. The specimens must have been mislabeled, for the species is now known from the vicinity of Rio de Janeiro, Brazil (Michener, 1965:42); one specimen [Lawrence].

Pygopasiphae new subgenus

Type species: *Leioproctus mourellus* new species.

The most distinctive characters of *Pygopasiphae* are the short, erect, unbranched, capitate hairs of the metasomal sterna of the female, and the distinct pygidial plate and long, slender hind tarsi of the male. (Figs. 8, 10h, 19f)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Metasoma and legs red in some females of *L. mourellus*, black in other species. Length 7-11 mm. Pubescence largely pale (sometimes partly dusky on vertex, tibiae, and metasomal terga), forming apical pale bands on T1 or 2 to 4. b. *Inner orbits slightly converging below to subparallel in females*, converging in males; upper parts converging above. c. Maxillary palpus with about one segment extending beyond end of galea. g. Male flagellum reaching beyond tegula, middle segments about 1.5 to 1.8 times as long as broad. h. Propodeum with subhorizontal basal zone almost as long as to slightly longer than metanotum; triangle smooth, marginal line pitted or not. i. Anterior basitarsus of female with weakly differentiated row of hairs on outer margin. Basitibial plate pointed at apex, largely covered by hair in female. j. Femoral scopa rather short and sparse (hairs on trochanter simple), hairs simple or (in *L. wagneri*) those on distal half of anterior side of femoral corbicula with several preapical branches surpassed by rachis. Tibial scopa whitish or upper outer zone along tibia dusky; *long scopal hairs along lower margin of tibia not curved upward, spreading as far below tibia as scopa spreads above tibia, these hairs in L. mourellus plumose with several long branches exceeded by rachis, like hairs on outer face of tibia, in L. wagneri hairs of lower margin simple or with few short branches* (Fig. 19f) although quickly grading to hairs with long branches (as in *Perditomorpha*) on outer surface of tibia. k. Hind trochanter and tibia of male unmodified in *L. mourellus*, in *L. wagneri* trochanter with strongly produced angle or tooth on under side and hind tibia enlarged and truncate apically, tibial spurs arising far from one another on truncate apex. *Hind tarsus of male elongate, segment 2 several times as long as broad. Tibial spurs of female nearly straight or slightly curved, apices blunt, margins almost entire or with a few small teeth except inner margin of inner spur which is pectinate with two to five large teeth.* Tibial spurs of male nearly straight, pointed, finely and briefly ciliate. l. Wings with distal two fifths with minute hairs, *basal parts much more sparsely hairy but with a few relatively long hairs.* m. Sterna of female without scopa, *hairs erect, of uniform length, uniformly dispersed* (not forming apical bands or fringes), tips bent slightly backward and enlarged like keirotichia. S6 of male unmodified, short hairs directed laterad from broad longitudinal median elevation. Pygidial plate of female unusually large, apex rounded, not at all truncate. T7 of male with well defined (by carina

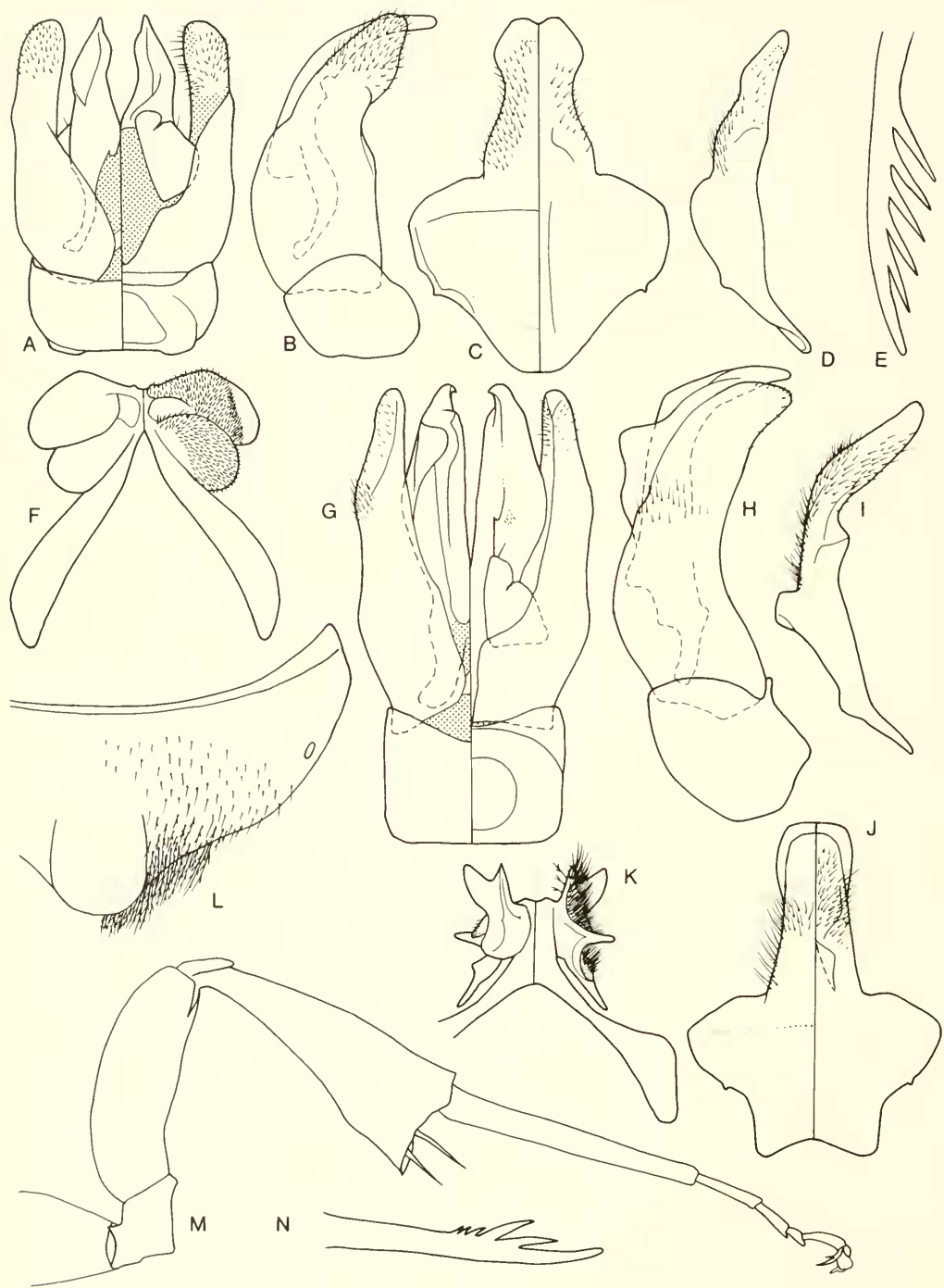


FIG. 8. a-f. *Leioproctus (Pygopasiphae) mourellus* n. sp. a-d and f. Genitalia, S8 and S7 of male. e. Inner hind tibial spur of female. g-n. *L. (P.) wagneri* (Vachal). g-k. Genitalia, S8 and S7 of male. l. T7 of male. m. Hind leg of male. n. Inner hind tibial spur of female.

posteriorly) pygidial plate, rounded posteriorly (in *L. wagneri* slightly narrowed basally). S7, S8, and genitalia of male as in Fig. 8. S7 with apical lobes variable in shape (Fig. 8f, k), hairs all or nearly all on ventral surfaces; S8 with process nearly straight or in *L. wagneri* strongly down-curved; gonostylus not separate from gonocoxite or separation visible only on ventral side.

Distribution: Xeric parts of Argentina (provinces of Santiago del Estero, Catamarca, La Rioja).

Included species: *Leioproctus* (*Pygopasiphae*) *wagneri* (Vachal, 1909) [*Pasiphae*], *L. (P.) mourellus* Michener, n. sp., and several undescribed species.

Comments: *L. mourellus* is less extreme in various ways than the larger species with modified male legs such as *L. wagneri*. I have made *L. mourellus* the type species because I have not seen type specimens of *L. wagneri*. The subgenus was first recognized (as a genus) by Moure over 30 years ago but, although he labeled specimens, he never published a description. Michener (1965) included *L. wagneri* in the subgenus *Bicolletes* (=

Perditomorpha).

Etymology: The subgeneric name is based on the Greek *pyge*, rump, with reference to the pygidial plate of the male, and *pasiphae*, an invalid generic name for paracolletines with only two submarginal cells (see subgenus *Spinolapis*).

Subgenus *Halictanthrena* Ducke

Halictanthrena Ducke, 1907:364. Type species: *Halictanthrena malpighiacearum* Ducke, 1907 (monobasic).

Leioproctus (*Halictanthrena*), Michener, 1965:42.

Distinctive features of the subgenus are the sharp tooth on the dorsolateral angle of the pronotum and the presence of erect hairs and lack of distinctive short hairs on the basitibial plate of the female. The subgeneric name suggests a bee with the aspect of *Halictus* or *Andrena*, probably with pale pubescence and a banded metasoma. *Halictanthrena*, however, is a rather slender bee with largely dark hair, no metasomal hair bands, and with the partially red metasoma suggesting *Sphecodes* more than *Halictus*. (Figs. 9, 10i)

Description: Agreeing with usual (rather than

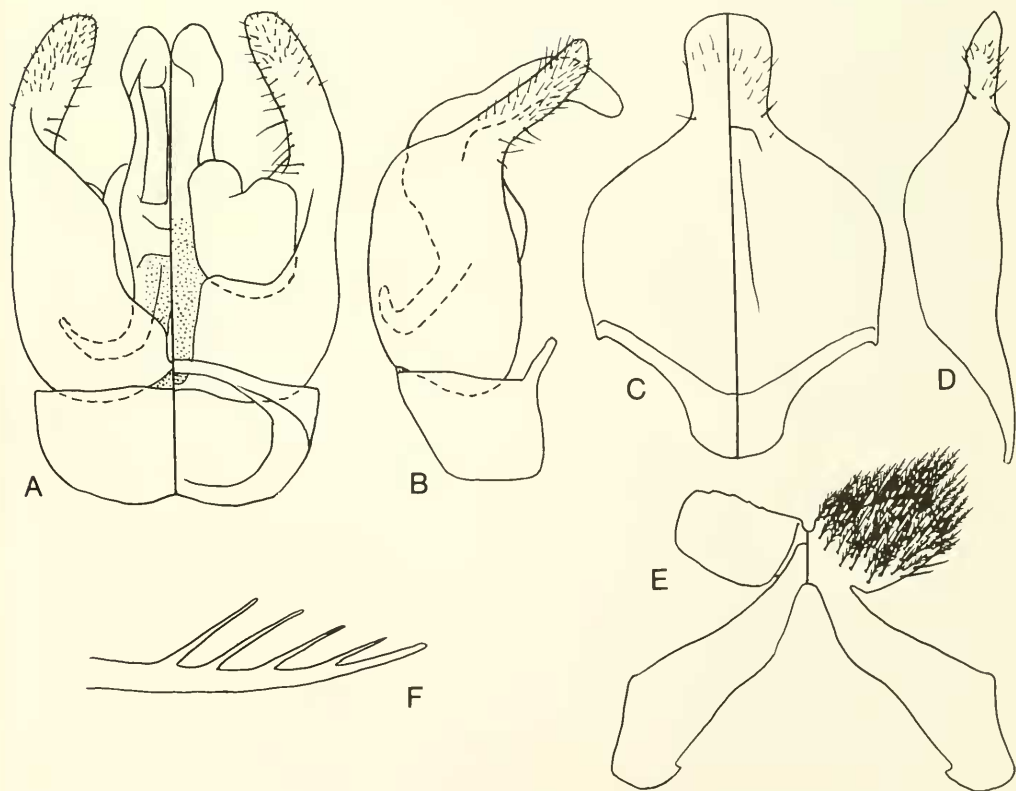


FIG. 9. a-f. *Leioproctus* (*Halictanthrena*) *malpighiacearum* (Ducke). a-e. Genitalia, S8 and S7 of male. f. Inner hind tibial spur of female.

exceptional) characters listed for *Perditomorpha* except as follows: a. First two metasomal terga dark red in female, metasoma largely red-brown in male. Length 6.5-9 mm. Pubescence of female blackish on dorsum, tibiae and basitarsi, pale yellow on face below antennae, sides and venter of body, femora, and lower margin of hind tibia; f male pale yellowish, dusky on dorsum, some

black hairs intermixed on scutellum. c. Clypeus with scattered coarse punctures, only sparsely haired. d. Labrum over four times as wide as long, apical margin weakly convex. e. *Mandible of female (not male) with convexity on upper margin basal to preapical tooth*, suggesting a tridentate condition. g. Male flagellum reaching scutellum, middle segments about 1.5 times as long as wide. h.

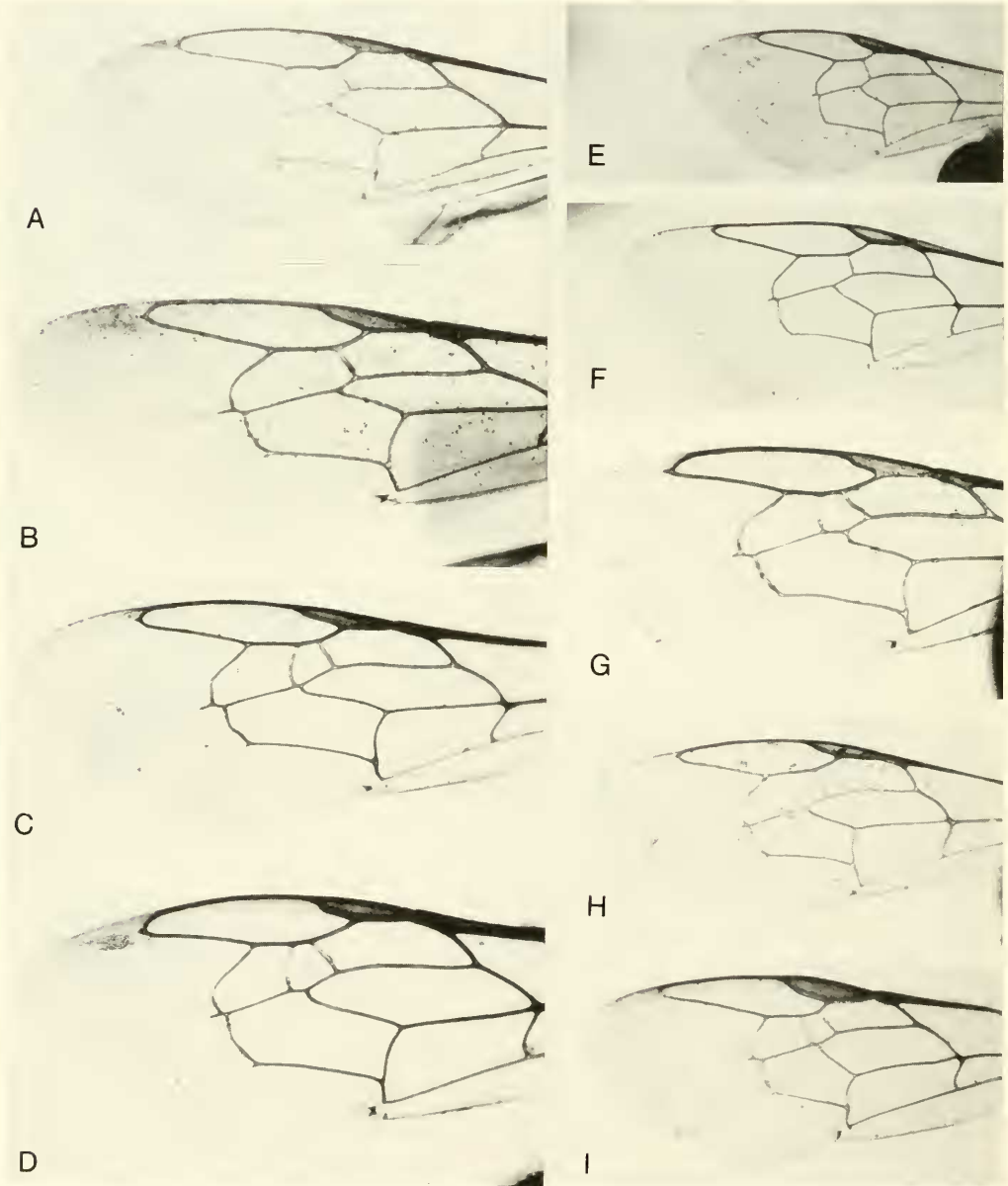


FIG. 10. Forewings. a. *Leioproctus (Perditomorpha) brunerii* (Ashmead). b. *L. (P.) flavicornis* (Spinola). c. *L. (Chilicolletes) delahozii* Toro. d. *L. (Holmbergeria) rubriventris* (Fries). e. *L. (Perditomorpha) neotropicus* (Fries). f. *L. (Kylopasiphæ) pruinosus* n. sp. g. *L. (Sarocolletes) rufipennis* (Cockerell). h. *L. (Pygopasiphæ) mourellus* n. sp. i. *L. (Halictanthrena) malpighiacearum* (Ducke).

Dorsolateral angle of pronotum with small, sharp tooth, projecting dorsolaterally, shorter than nearby hairs, in male so small as to be difficult to see except in profile. Propodeum with subhorizontal surface strongly sloping, about as long as metanotum, gradually curving onto declivous surface. i. Front basitarsus of female with abundant coarse bristles, strongly curved at apices, on outer surface. j. Scopal hairs on outer side of tibia often with rachis extending slightly beyond other branches. Scopal hairs near upper margin of tibia particularly coarse near bases, shorter near base of tibia, similar coarse, nearly erect hairs arising from and nearly hiding basitibial plate which is pointed apically; anterior carina of basitibial plate of female weak for short distance preapically. l. Three submarginal cells, 2 much shorter than 3; basal vein of forewing approximately meeting cu-v; jugal lobe of hind wing reaching distinctly beyond level of cu-v. m. S6 of male broadly convexly subtruncate. Pygidial plate of male represented by broad, smooth hairless area delimited posteriorly by distinct, convex carina. n. S7, S8, and genitalia of male as in Fig. 9a-e; S7 with a single hairy apicolateral lobe on each side, S8 with apical process short and shoulders sloping.

Distribution: State of Minas Gerais, Brazil.

Included species: *Leioproctus (Halictanthrena) malpighiacearum* (Ducke, 1907).

Comments: This distinctive subgenus is known to me only from a single pair of specimens [Berlin]. Characters not listed above include the unusually large stigma (Fig. 10i), larger than in any other American colletine, and the opposed teeth on the male volsella (not exposed in ventral view).

Torocolletes new subgenus

Grupo Fazii Toro, 1973a:156. Type species: *Lonchopria fazii* Herbst, 1923.

The largely dull integument without recognizable punctures except on the clypeus is characteristic of this subgenus, as are the protuberant clypeus, distinct malar area, reduced jugal lobe of the hind wing, and other characters italicized below. (Fig. 16a; Figs. 115-132, Toro, 1973a)

Description: a. Integument dark blue to black, except for clypeus with only minute and widely separated punctures on finely roughened surface, that of head and thorax dull. Length 7-11 mm. Pubescence mostly pale, not forming bands on terga. b. Inner orbits converging below. c. Clypeus moderately coarsely punctate, lower lateral areas more sparsely so and shiny than flat median area. Clypeus produced well below lower tangent of eyes and protuberant in front of eye by about eye width. Malar area longer than flagellar diameter. d. Labrum of both sexes convex, shining, twice as broad as long or slightly more; apex strongly convex; fringe little if any longer than labrum; apicolateral lobe absent (illustrated by Toro, 1973). e. Maxillary palpus with segment 3 reaching beyond apex of

galea, segments 4-6 together slightly longer than 1-3 together. Mandible with preapical tooth on upper margin in both sexes (illustrated by Toro, 1973). Glossa with lobes broader than long. f. Ocelli as usual in *Perditomorpha*, vertex not at all elevated, flat or concave between ocelli and summit of eye. g. Male flagellum reaching front of scutellum, middle segments about 1.5 times as long as broad. h. Propodeum with subhorizontal surface sloping, about as long as metanotum; propodeal triangle dull, minutely and closely areolate, marginal line not pitted. i. Anterior basitarsus of female without comb or row of hairs. Basitibial plate defined by carina, narrowly rounded at apex in both sexes. j. Femoral and tibial scopa sparse, hairs not very long; femoral corbicular with scattered short hairs, mostly with one or two branches, on surface; hairs anterior to corbicular with a few long branches surpassed by rachis; hairs posterior to corbicular simple in contrast to long, loosely plumose hairs on trochanter; tibial scopa with hairs of lower margin as described for *Perditomorpha* but usually with one branch (rachis) surpassing the others, hairs of outer surface and especially upper margin of tibia with two or three long branches but rachis strong and bare beyond the branches. k. Tibial spurs straight, inner margin of inner hind spur finely pectinate to coarsely ciliate (illustrated by Toro, 1973). l. Wings with minute hairs distally, hairs longer and sparser basally; three submarginal cells, cell 2 much shorter than 3 and receiving first recurrent vein near middle; basal vein meeting or beyond cu-v; jugal lobe of hind wing terminating well before cu-v and scarcely over half as long as vannal lobe. m. S2-5 of female with distinct preapical bands of mostly simple, suberect hair similar to that of *Perditomorpha*; hairs markedly shorter than length of sternum. S6 of male unmodified. Pygidial plate of male absent, not represented by area of sparser hair. n. S7, S8, and genitalia of male as illustrated by Toro (1973), not differing from those of *Perditomorpha*; S7 with lobes slender as in *L. (Chilicolletes) delahozii*.

Distribution Central Chile.

Included species: *Leioproctus (Torocolletes) fazii* (Herbst, 1923) [*Lonchopria*] and *ibanezii* (Ruiz, 1944) [*Lonchopria*]. (Some specimens at Lawrence are probably erroneously labeled as from a locality in Cordoba Prov., Argentina; see Daly et al., 1987, for comments on similarly labeled *Manuelia*.)

Comments: Both species of *Torocolletes* were erroneously included in *Lonchopria* by Michener (1965).

Although the sternal hairs of the female resemble those of most *Perditomorpha* and *Chilicolletes*, specimens with tibial pollen loads do not have pollen on the sternum as is usual in *Perditomorpha*.

In its distinct malar space, *Torocolletes* resembles *Nesocolletes* from New Zealand. The latter subgenus, however, has only one pair of small later-

apical lobes on S7 of the male, a subvertical propodeal profile (i.e., without the long subhorizontal surface found in *Torocolletes*), and is punctate and shining (i.e., without the distinctive dull cuticle of *Torocolletes*). The somewhat elongate malar space is presumably of independent origin in the two groups. Some undescribed Australian species of *Leioproctus* also have elongate malar areas but in other characters are unrelated to *Nesocolletes* and *Torocolletes*.

Etymology: The subgeneric name is a patronymic for Haroldo Toro of Valparaiso, Chile, who first characterized the group, plus the generic name *Colletes*.

Subgenus *Hexantheda* Ogloblin

Hexantheda Ogloblin, 1948:172. Type species: *Hexantheda missionica* Ogloblin, 1948, by original designation.

The long, six- or seven-segmented labial palpi are unique. The metasoma of the male is robust like that of a female. (Figs. 11, 16b; Figs. 16-23, Ogloblin, 1948)

Description: Agreeing with usual (not exceptional) characters of *Perditomorpha* except as follows: a. Length 8-12 mm. *Male metasoma broad like that of female*. Pubescence mostly whitish, forming at most weak pale tergal bands. b. Inner orbits slightly converging below (except for upper ex-

termities) in female, almost parallel in male. c. *Clypeus protuberant in front of eye by about eye width*. d. Labrum over four times as wide as long; apical margin feebly convex in female, weakly concave in male; bare convex surface depressed medially in male. e. Mandible of male with upper margin basal to preapical tooth convex (Fig. 11e). Maxillary palpus two-thirds as long as prementum, much longer than maxillary palpus, six- or seven-segmented (illustrated as 6-segmented by Ogloblin, 1948). f. Vertex considerably extended and convex behind the unusually small ocelli. g. Male flagellum scarcely reaching mesoscutum, middle segments much broader than long (illustrated by Ogloblin, 1948). h. Propodeum with subhorizontal surface a little shorter than metanotum; triangle shining, transversely wrinkled, marginal line not pitted. i. Basitibial plate narrowly rounded at apex in female, pointed in male. *Male with strong carina extending from apex of basitibial plate to apex of tibia*. j. Tibial scopa rather sparse, some hairs on lower margin simple and nearly straight so that scopa extends farther below tibia than above, but most hairs near lower margin curved upward and with long branches as in *Perditomorpha*; hairs of most of outer surface simple or with one or two branches directed apicad, rachis surpassing branches. k. Tibial spurs gently curved, those of male and of mid tibia of female ciliate, hind spurs of female serrate except inner margin of inner spur which is

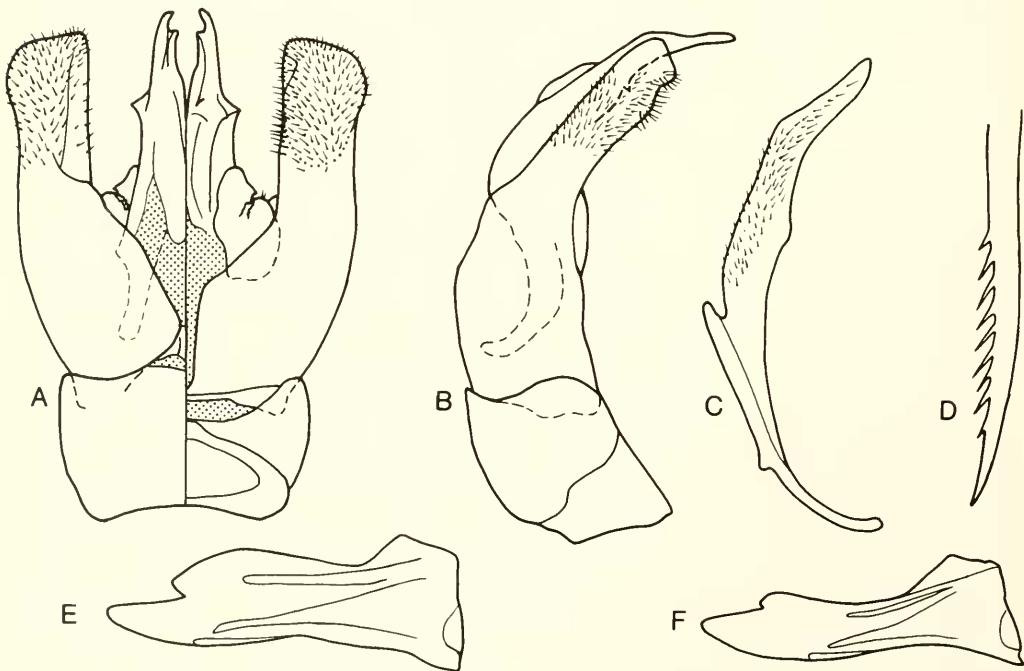


FIG. 11. *Leioproctus (Hexantheda) missionica* (Ogloblin). a-c. Genitalia and lateral view of S8 of male. d. Inner hind tibial spur of female. e, f. Mandibles of male and female.

pectinate with slender teeth (Fig. 11d). l. Basal vein of forewing meeting cu-v. m. S5 of male with long apical fringe. T7 of male with convex, bare pygidial area, tapering posteriorly, as in *L. (Perditomorpha) zonatus*. n. S7, S8, and genitalia of male as illustrated by Ogloblin (1948); see also Fig. 11a-c. S7 with apical lobes not broad and rounded as is common in *Perditomorpha*, basal one deeply divided so that there are three lobes on each side instead of two. Process of S8 downcurved.

Distribution: Southern Brazil (state of Paraná) and northern Argentina (provinces of Misiones and Formosa).

Included species: *Leioproctus (Hexantheda) missionica* (Ogloblin, 1948), new combination.

Comments: Michener (1965) considered *Hexantheda* to be a genus distinct from *Leioproctus* but the long labial palpi with a variable number of segments are the single character that might justify such placement. *Hexantheda* is probably a derivative of *Perditomorpha*-like ancestors with a few striking autapomorphies such as the labial palpi.

Subgenus *Protodiscelis* Brèthes

Protodiscelis Brèthes, 1909:245. Type species: *Protodiscelis fiebrigi* Brèthes, 1909 (monobasic).

Leioproctus (Protodiscelis); Michener, 1965:42.

Protodiscelis resembles *Tetraglossula* in the simple mandibles of the male (a character found otherwise in American *Leioproctus* only in the unrelated subgenus *Cephalocolletes*) and in the presence of apicolateral lobes on the very short labrum of the female. These are both apomorphies that unite the two subgenera. *Protodiscelis* differs from *Tetraglossula*, however, in numerous features such as the scarcely elongate glossa and the plumose scopal hairs of both metasomal sterna and hind legs. (Figs. 12, 16e, 19c)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Length 6-9 mm. Pubescence all pale or that of dorsum brown to dusky, sometimes scopa dusky; hairs forming at most weak apical bands on metasomal terga which usually lack hair bands. b. Inner orbits converging below to nearly parallel; *paraocular area convex in female* except upper parts where there is a shiny, depressed, usually ill-defined fovea extending onto vertex and mesad toward ocelli. d. *Labrum a transverse band six times as wide as long or nearly so*, surface entirely occupied by convexity which in males and some females is lower medially, sometimes with small weak median convexity between larger lateral ones; apical margin rather straight, with bristles longer than labrum, *female with apicolateral lobe* [usually smaller than in *L. (P.) spathigerus*, Fig. 12f, l]. e. *Maxillary palpus long, apex of third segment beyond apex of galea. Mandible of male not toothed, of female unusually slender with*

preapical tooth small. Glossa with lobes unusually prominent, as broad as long or longer. h. Propodeum with subhorizontal surface nearly as long as to longer than metanotum; triangle shining and nearly smooth or transversely striate, marginal line usually not pitted. Basitibial plate narrowly rounded to pointed at apex. j. *Femoral corbicula usually with rather long, mostly simple hairs arising from surface. Hairs on anterior and posterior sides of corbicula, also hairs of trochanter, long, rather dense, with numerous short branches* (similar to those of tibial scopa. Tibial scopa strong but not obscuring surface, hairs of lower margin bent apicad but not upward, hairs extending farther below than above tibia, *strongly plumose, rachis surpassing the numerous short branches* (Fig. 19e); hairs of inner surface of tibia mostly plumose but on distal half an area of long, unbranched but apically capitate keitrichia; hairs of hind basitarsus on outer surface and upper margin plumose. k. Tibial spurs straight or gently curved, *inner hind tibial spur finely pectinate* (Fig. 12i, k), others ciliate. l. Jugal lobe of hind wing slightly to distinctly exceeding level of cu-v. m. S2-6 of female with apical bands of sloping to erect hair; hairs considerably shorter than exposed parts of sterna, plumose with numerous short branches like scopal hairs of hind leg. n. S7, S8, and genitalia as in Fig. 12a-d. Gonostylus much narrower than body of gonocoxite.

Distribution: Northeastern Brazil (Paraíba) to the state of Paraná and to Paraguay.

Included species: *Leioproctus (Protodiscelis) fiebrigi* (Brèthes, 1909), *spathigerus* Michener, n. sp., and probably *palpalis* (Ducke, 1908) [*Panurginus*]. There are also several undescribed species. In the American Museum of Natural History there are "typus" specimens of an apparently unpublished Friese species named for its piceous coloration. An undescribed species from the State of Rio de Janeiro, Brazil, is unusually large (9 mm long) with the head longer than broad. The male is unknown; two females are at [Lawrence]. I have not seen authentic specimens of *L. palpalis*; its tentative placement here is based on specimens identified largely because of Ducke's remarks on its large maxillary palpi.

Comments: Recognition of the subgeneric name *Protodiscelis* has been difficult. Ducke (1912) and Cockerell (1919) placed it with *Oediscelis* (= *Chilicola*) in the Xeromelissinae, perhaps largely because of the name, while Schrottky (1913) included it in the "Prosopidae" (= Hylaeinae). For one familiar with ordinary, rather hairy paracolletines, the subgeneric name and placements in Xeromelissinae or Hylaeinae seem to indicate a form not in the Paracolletinae. However, some species of *Protodiscelis* such as *L. (P.) fiebrigi* (Brèthes) have such short and sparse hair that the males superficially resemble *Chilicola* or other Xeromelissinae. As explained in the Appen-

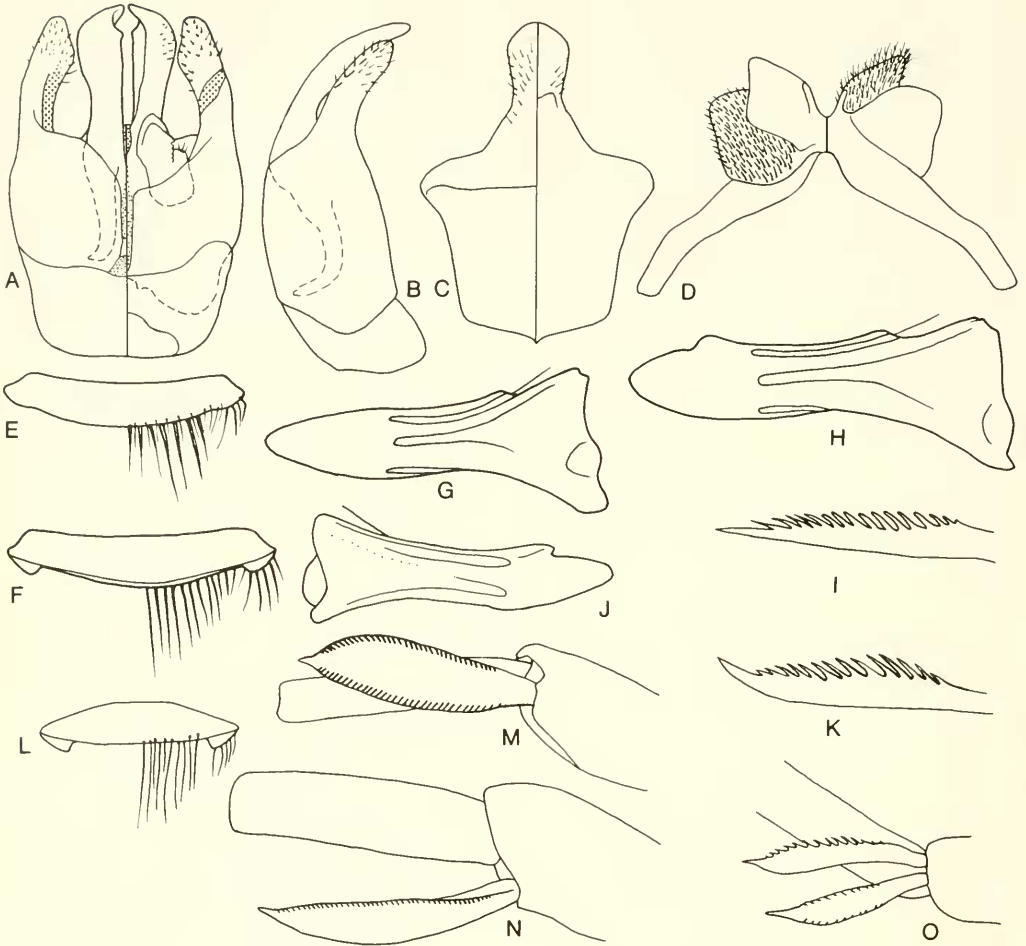


FIG. 12. a-d. *Leioproctus (Protodiscelis) fiebrigi* (Brèthes), male holotype, genitalia, S8 and S7. e-i. *L. (P.) palpalis* (Ducke)? e, f. Labrum, male and female. g, h. Mandible, male and female. i. Inner hind tibial spur of female. j-o. *L. (P.) spathigerus* n. sp., female. j. Mandible. k. Inner hind tibial spur. l. Labrum. m, n. Ventral and anterior views of middle tibial spur, apex of tibia, and basitarsus. o. Ventral view of hind tibial spurs, inner spur above.

dix, Brèthes described a male, thinking that it was a female; of course it did not have a scopa and other features of female Paracolletini.

Moure (1951) discussed *Protodiscelis* briefly among groups now included in the Paracolletini, but gave no characters or indications of the reasons for that placement. It is here properly placed, near *Tetraglossula*, for the first time.

Subgenus *Tetraglossula* Ogloblin

Tetraglossula Ogloblin, 1948:165. Type species: *Tetraglossula deltivaga* Ogloblin, 1948, by original designation.

This subgenus was not included in *Leioproctus*

by Michener (1965) but it is as much part of that genus as are the other subgenera. The simple mandible of the male shows its relationship to *Protodiscelis*, which has a slightly more bifid glossa than most subgenera, thus approaching *Tetraglossula*. The deeply bifid glossa suggests *Glossopasi-phae*, which, however, has a subapical mandibular tooth in the male and plumose scopal hairs. (Figs. 13, 16f; Figs. 1-15, Ogloblin, 1948)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Metasoma sometimes partly or largely yellowish red. Length 6-12 mm. Metasomal hair bands absent or weak. b. Inner orbits not or very slightly converging below (both sexes), almost

without concave region so that upper parts of orbit are not greatly different in orientation from remainder. d. Labrum about six times as wide as long; apical margin weakly concave to weakly convex; male with basal three fifths or more shining, convex, weakly binodulose; female with most of surface strongly elevated, binodulose, between nodules with transverse depression surrounded by carinae; lateral lobes weak in male, conspicuous and serrate or pectinate in female; apical bristles much longer than labrum. Apical margin of clypeus of male with small median convex lobe overhanging labrum. e.

Maxillary palpus long, last or last two segments extending beyond apex of galea. Mandible simple in male (Ogloblin, 1948, Fig. 8), slender in female. Glossa deeply bifid, each lobe attenuate, hairy, seven to ten times as long as basal width (Ogloblin, 1948, Fig. 9) annulate part extending well out into base of each lobe. Galea much longer than stipes, postpalpal part pointed apically, four or five times as long as basal width (Ogloblin, 1948, Fig. 9). f. Ocelli in front of summit of vertex; vertex convex and rounded behind ocelli; anterior margin of median ocellus in front of to

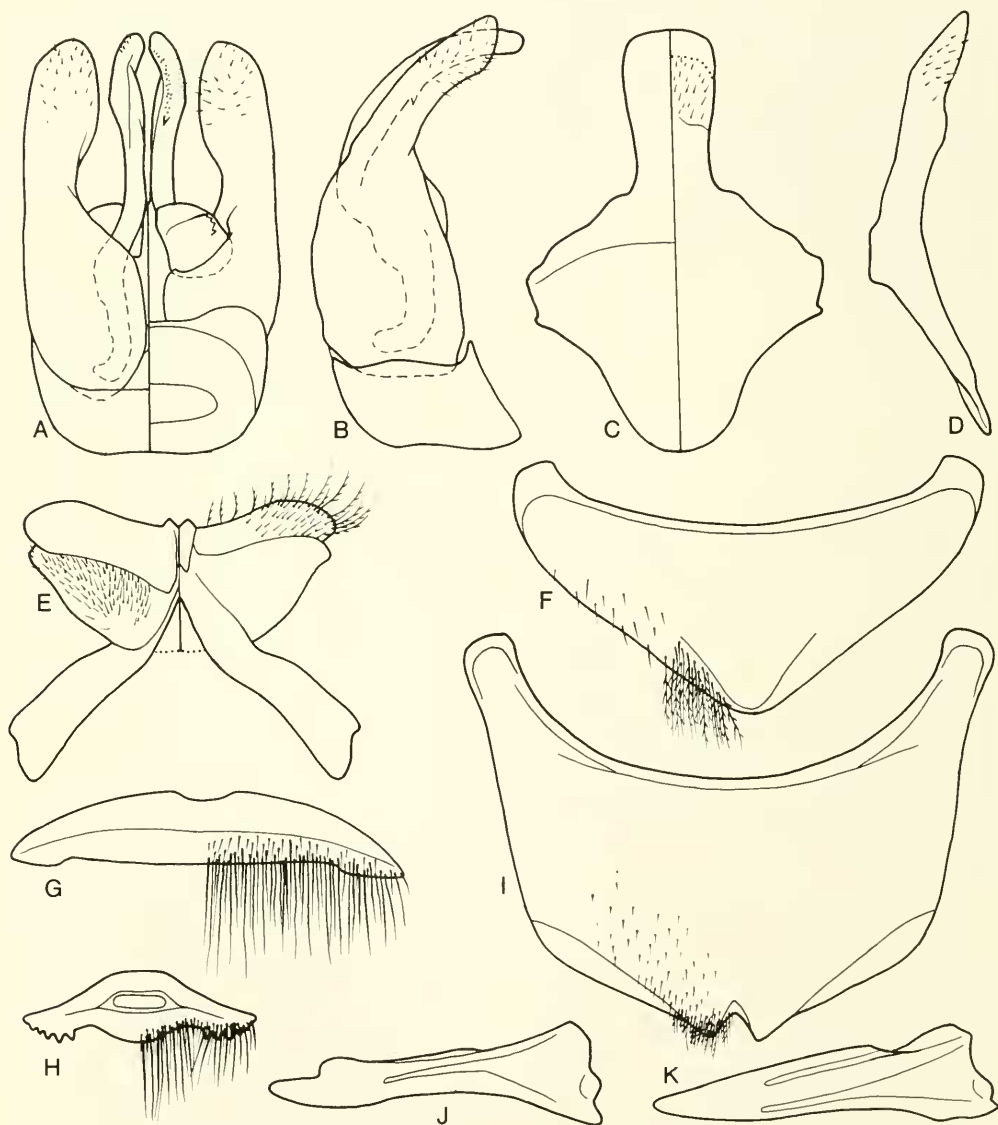


FIG. 13. *Leioproctus (Tetraglossula) fucosus* n. sp. a-e. Genitalia, S8 and S7 of male. f. T7 of male. g, h. Labrum of male and female (g at twice the magnification of h). i. S6 of male. j, k. Mandibles of female and male.

behind midpoint between antennal bases and posterior margin of vertex. g. Male flagellum not attaining tegula, middle flagellar segments distinctly broader than long. h. Propodeum with basal zone in profile sloping, about as long as metanotum; triangle smooth with marginal groove strongly pitted. i. Apex of basitibial plate narrowly rounded. j. Corbicular surface with some simple hairs on basal half. *Femoral and tibial scopa, and that of distal part of trochanter, of sparse simple hairs* (in *L. fucosus* many hairs of outer surface of tibia, except lower margin, with one or two branches, often three on hairs of upper margin); hairs of lower margin of tibia curved apicad but not extending farther below tibia than above. k. Tibial spurs straight or gently curved, inner margin of inner hind tibial spur pectinate, other margins ciliate (Ogloblin, 1948, Fig. 4). l. Basal vein of forewing meeting or distal to cu-v (Ogloblin, 1948, Fig. 3); jugal lobe of hind wing exceeding level of cu-v. m. *T7 of male with triangular, bare pygidial plate*, tapering to narrow rounded apex on tergal margin and margined laterally by weak carina, beyond which surface is densely hairy. S2-5 of female with scopa of simple hairs longer than length of sternum. n. S7, S8, and genitalia of male as in Fig. 13a-e (also Ogloblin, 1948, Figs. 5-7, 13-15).

Distribution: Argentina (provinces of Buenos Aires, Tucumán, and Misiones) and Brazil (states of Paraná, São Paulo, and Pará).

Included species (*marks species not seen by me): *Leioproctus* (*Tetraglossula*) *anthracinus* Michener, n. sp.; *bigamicus* (Strand, 1910) (= *Tetraglossula birabeni* Ogloblin, 1948, according to Moure, 1951), new combination; *deltivagus* (Ogloblin, 1948), new combination; *fucosus* Michener, n. sp.; and **stigmaticus* (Strand, 1910), new combination.

Comments: The species of *Tetraglossula* are quite diverse in appearance, although morphologically similar. *L. (T.) deltivagus*, *bigamicus*, and *stigmaticus* are black with pale pubescence and thus rather ordinary looking gray bees. *L. (T.) anthracinus* is black haired. *L. (T.) fucosus* is a smaller species with a largely reddish metasoma; superficially it exactly resembles females of *L. (Perditomorpha) brunerii*.

Reedapis new subgenus

Grupo *L. semicyaneus* Toro 1973a:162. Type species: *Leioproctus bathycyaneus* Toro, 1973.

Superficially the rather large, robust species of *Reedapis* closely resemble those of *Spinolapis* that are found in the same area. *Reedapis* differs from *Spinolapis* in having three submarginal cells, bifid claws in the female, rather uniformly punctured and hairy clypeus, rather short male flagellum, etc. The two groups are not closely related in spite of superficial appearance. *Reedapis* is actually more

similar to *Perditomorpha* and *Chilicolletes*. It differs from those subgenera not only in appearance (and from *Perditomorpha* in having three submarginal cells) but also in the distinct row or comb of hairs on the outer margin of the front basitarsus of the female and in the strongly pectinate condition in females and some males of both inner and outer hind tibial spurs and of the mid tibial spur. The closest relative of *Reedapis* is *Cephalocolletes*; these subgenera differ conspicuously in the characters listed in the key. (Figs. 14h, i, 16c, 19g; Figs. 110-114, 133-152, Toro, 1973a)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Integument black with the metasoma at least weakly metallic blue. Length 9 to 15 mm. Head, venter of thorax, and metasoma with much black hair. T1-3 with apical bands of white hair, sometimes weak on T1 and weakly indicated on T4. b. Inner orbits slightly to strongly converging below. d. Labrum over three times as wide as long, apex straight or broadly emarginate with bristles longer than labrum; basal elevated bare zone strong and well defined in female, longer than distal depressed zone, in male not well defined but occupying much of labral surface (for figures, see Toro, 1973a). f. Anterior margin of median ocellus at or behind midpoint between antennal bases and posterior margin of vertex. g. Middle flagellar segments of male a little longer than broad. h. Propodeum with subhorizontal surface about as long as metanotum, which is convex and elevated medially in *L. semicyaneus*; propodeal triangle smooth to transversely wrinkled. i. *Anterior basitarsus of female with comb-like row of hairs on outer margin*. j. Femoral and tibial scopa well developed, blackish. Hairs in front of femoral corbicula with several long branches but main rachis usually surpassing apices of branches; hairs behind femoral corbicula with only few short branches. Tibial scopa with lower hairs not much curved upward, not extending farther below tibia than upper hairs extend above it, lower hairs with several long branches usually surpassed by rachis (Fig. 19g), hairs of upper part with lateral branches conspicuously surpassed by rachis. k. Middle and hind tibial spurs straight to curved, all coarsely pectinate in both sexes of *L. (R.) semicyaneus*, all pectinate in female and finely pectinate in male of *L. bathycyaneus* (illustrated by Toro, 1973a, whose illustrations represent inner and outer hind tibial spurs, contrary to the captions). l. Wings hairy throughout but basal halves with hairs sparse and relatively long; three submarginal cells, second usually subequal to or longer than third on posterior margin except in occasional individuals in which second is much shorter than third; second receiving first recurrent vein near middle. m. S2-5 of female with scopa of dusky or blackish somewhat appressed plumose hairs nearly as long as exposed parts of sterna, branches mostly di-

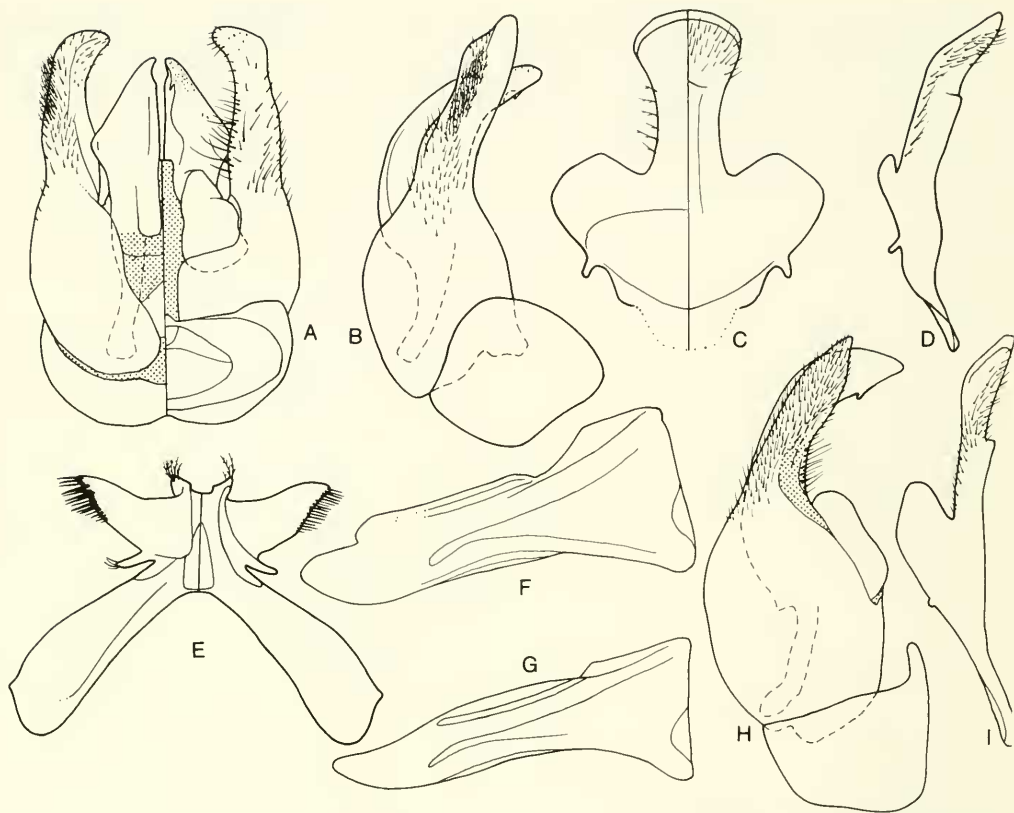


FIG. 14. a-f. *Leioproctus* (*Cephalocolletes*) *laticeps* (Fries). a-e. Genitalia, S8 and S7 of male. f, g. Mandibles of female and male. h, i. *L. (Reedapis) bathycyaneus* Toro, male, genitalia and S8 (lateral view).

rected apicad (Fig. 19h). S5 of male with long, incurved marginal hairs. n. S7, S8, and genitalia of male as illustrated by Toro (1973a). Gonostylus and gonocoxite fused on dorsal surface but separable on ventral surface, gonostylus about as long as but much more slender than gonocoxite. S7 with lateroapical lobe deeply bifid, or in *L. bathycyaneus* according to Toro (1973a), basal division much reduced. (In a specimen determined by Toro as *L. bathycyaneus*, however, the lobe is divided more or less as in *semicyaneus*; perhaps there are more species.)

Distribution: Central Chile.

Included species: *Leioproctus* (*Reedapis*) *semicyaneus* (Spinola, 1851) [*Colletes*]; *bathycyaneus* Toro, 1973; and **melanocyaneus* Toro, 1973. *Biglossa caerulescens* Fries, 1906, is a synonym of *L. (Reedapis) semicyaneus* (Spinola) and a homonym of *L. (Spinolapis) caerulescens* (Spinola, 1851). This synonymy was omitted by Toro (1973a).

Comments: An unusual feature of *L. semicyaneus* is the presence of two subantennal "sutures" or lines below each antennal base. They converge

toward the clypeus and meet just above the upper margin of the clypeus, so that the subantennal area is triangular. It is smooth, impunctate, unlike adjacent parts of the face. The inner line probably represents merely a change in surface sculpture but it is fully as conspicuous as subantennal sutures in many Andrenidae. *L. bathycyaneus* has no such subantennal areas.

The subgeneric name was used (at the genus level) on labels over 30 years ago by Padre J. S. Moure but has not been published. I use *Reedapis* as a patronymic in recognition of Edwyn C. Reed, well known for a study of Chilean bees, plus the generic name *Apis*. Since I have not seen type or authentic material of *L. semicyaneus*, I have designated *L. bathycyaneus* as the type species, although I have no reason to doubt the customary identification of the common species, *L. semicyaneus*.

Cephalocolletes new subgenus

Type species: *Biglossa laticeps* Fries, 1906.

Cephalocolletes differs from *Reedapis* in having the head very broad so that the interocular distance is much greater than the eye length, the eyes scarcely converging below in males and parallel in females, the vertex much enlarged (see character f below), the labrum slightly less than three times as wide as long (with the apex convex in the female), the mandible of the male edentate (Fig. 14g), the female sternal scopal hairs with branches somewhat longer and less numerous than illustrated for *L. bathycyaneus*, and T7 of the male with a longitudinal median bare line. The relationship of *Cephalocolletes* to *Reedapis* is shown by the male genitalia and sterna, the scopa, the large second submarginal cell, etc. (Figs. 14a-g, 16d)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Integument and pubescence black. Length 10-16 mm. b. *Inner orbits parallel in female, feebly converging below in male; head unusually broad, interocular distance much greater than eye length.* c. *Clypeal hairs short*, especially in female. d. Labrum nearly three times as wide as long, apex convex in female, weakly emarginate in male, bristles as long as labrum; basal elevated zone strong and well defined in both sexes, longer than distal depressed zone. e. *Mandible simple in male.* f. *Ocelli far from posterior margin of much developed, convex vertex; all ocelli closer to antennal bases than to posterior margin of vertex.* g. Male flagellum with middle segments a little longer than broad. h. Propodeum with horizontal surface a little longer than metanotum. i. *Anterior basitarsus of female with comb-like row of hairs on outer margin.* j. Femoral and tibial scopa as in *Reedapis*. k. Inner hind tibial spur of female with inner margin coarsely pectinate; otherwise spurs finely pectinate (female) to ciliate (male). l. Wings as described for *Reedapis*. m. Exposed sterna and terga as described for *Reedapis* but scopal hairs mostly with longer and less numerous branches than illustrated for *Reedapis* and T7 of male with longitudinal median bare line. n. S7, S8, and genitalia of male as in Fig. 14; S7 with only one large lateroapical lobe on each side, basal lobe greatly reduced.

Distribution: Argentina (provinces of Tucumán, La Rioja, Catamarca and Mendoza). The coarse pollen on the females suggests that this bee is a cactus visitor.

Included species: *Leioproctus (Cephalocolletes) laticeps* (Friese, 1906) [*Biglossa*]

Comments: *Cephalocolletes* superficially resembles black species of *Brachyglossula* or even the large black-haired species of *Lonchopria* (*Biglossa*); it differs from those groups by the generic characters.

Cephalocolletes and *Reedapis* are the only subgenera of *Leioproctus* with the second submarginal cell rather long compared to the third (except in a few

individuals of *Reedapis*). See couplet 3 of the key to subgenera for details. This is a *Lonchopria*-like feature but in other respects these are clearly groups of *Leioproctus*.

Subgenus *Spinolapis* Moure

Pasiphae Spinola, 1851:226 (not Latreille, 1819). Type species: *Pasiphae caerulea* Spinola, 1851, designated by Sandhouse, 1943:585.

Spinolapis Moure, 1951:193. Type species: *Pasiphae caerulea* Spinola, 1851, by original designation. *Leioproctus (Spinolapis)*; Michener, 1965:41.

From the superficially similar *Reedapis*, *Spinolapis* differs by having only two submarginal cells, by the reduced (or absent) inner tooth on the claws of the female, by the finely pectinate or ciliate tibial spurs, etc. (Figs. 15, 16g; Fig. 136-139, Toro, 1973b)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Integument largely metallic blue or head and thorax black. Length 9-12 mm. Head, venter of thorax, and metasoma with much of hair black; metasoma without hair bands. c. Clypeus somewhat protuberant with broad, transverse, shining, sparsely punctate or impunctate, preapical band; basal part flat and closely punctate. d. Labrum as described for *Reedapis* (Fig. 15i, j, and Toro, 1973b for *L. cyaneus* = *cerdai*). e. Maxillary palpus with segments 5 and 6 beyond apex of galea. Mandible with preapical tooth often worn completely away in females. f. Ocelli as described for *Reedapis*. g. Male flagellum reaching at least to scutellum, middle segments about twice as long as broad, or in *L. cyaneus* only reaching tegula and middle segments scarcely 1.5 times as long as broad. h. Propodeum with subhorizontal zone slanting, about as long as or shorter than metanotum, triangle shining or dull and granular in *L. cyaneus*; marginal line not or scarcely pitted. i. Anterior basitarsus of female without or (in *cyaneus*) with comb-like row of hairs on outer margin. *Claws of female simple or (in L. cyaneus) with small tooth.* j. Femoral and tibial scopa well developed, pale (in *L. cyaneus*) to black. Femoral scopal hairs rather short, not much curved, those in front of corbicular with two or three long branches but main rachis usually surpassing other branches; hairs behind femoral corbicular almost simple. Tibial scopa with lower hairs not much curved upward, not extending farther below tibia than upper hairs extend above it, lower and outer hairs with a few long branches, some with and others without a rachis surpassing other branches. k. Middle and hind tibial spurs of both sexes straight, ciliate (more coarsely so than in *Perditomorpha* s. str.) or in female of *L. cyaneus*, inner hind tibial spur finely pectinate (see Toro, 1973, as *cerdai* Toro). l. Wing hairs as described for *Reedapis*; two submarginal cells; basal vein meeting or distal to cu-v;

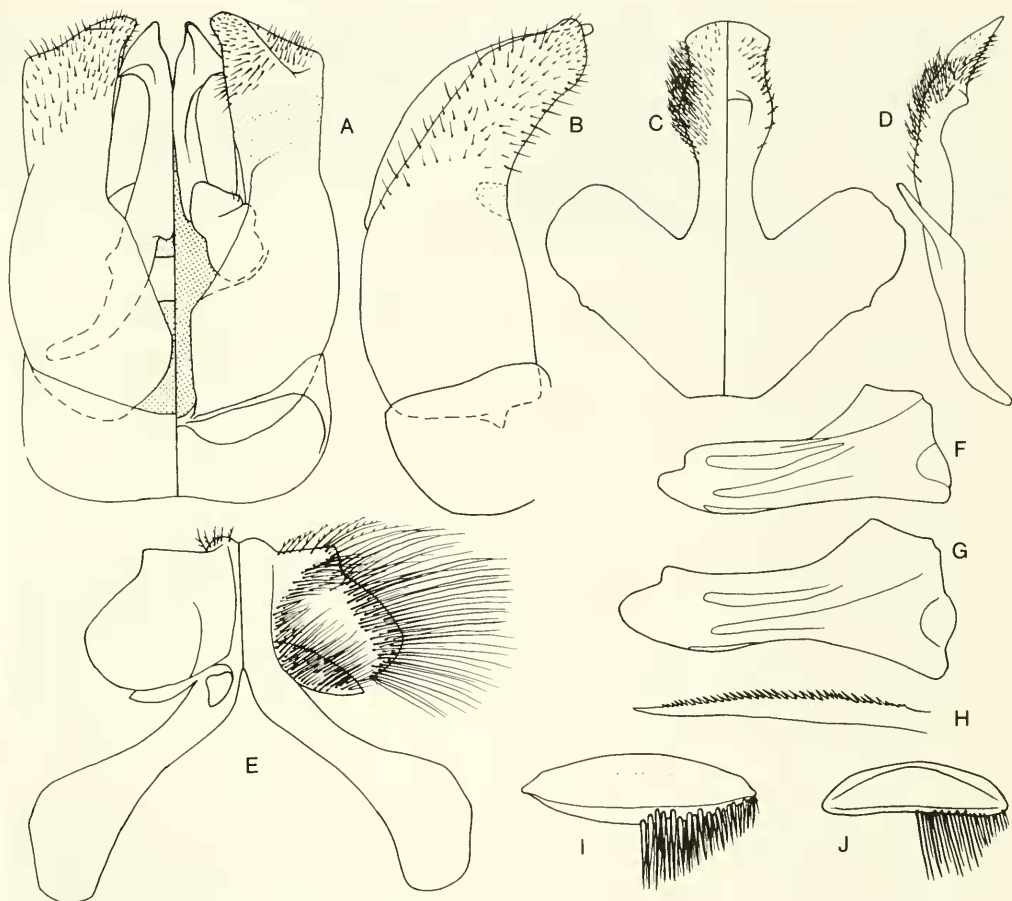


FIG. 15. *Leioproctus (Spinolapis) caeruleus* (Spinola). a-e. Genitalia, S8 and S7 of male. f, g. Mandibles of male and female. h. Inner hind tibial spur of female. i, j. Labrum of female and male.

jugal lobe reaching or surpassing level of cu-v. m. S2-5 of female with rather short pollen carrying hairs, shorter than exposed parts of sterna, often somewhat erect, some simple, others with rather short, apically directed branches. S6 of male with narrower midapical lobe than in other subgenera, otherwise unmodified except for apicolateral densely hairy shoulders in *L. caeruleus*. Pygidial plate of male not defined but T7 of male with broad, longitudinal, median hairless ridge which in *L. cyaneus* is broad basally and tapers toward apex like a pygidial plate; apex of T7 densely hairy. Pygidial plate of female narrow and parallel-sided apically. n. S7, S8, and genitalia of male as in Figure 15a-c; in *L. (S.) cyaneus* the two apical lobes on each side of S7 are both broad and rounded, the apical process of S8 is shorter than in *caeruleus*, and the apical half of the gonoforceps is slender.

Distribution: Central Chile and the Lake District of Argentina to Tierra del Fuego.

Included species: *Leioproctus (Spinolapis) caeruleus*

(Spinola, 1851) [*Pasiphae*] and a closely related species. *L. (Spinolapis) cyaneus* (Cockerell, 1915) [*Pasiphae*] (= *L. cerdai* Toro, 1973) and a related species, perhaps *L. (Spinolapis) melanurus* (Cockerell, 1917) [*Pasiphae*], probably belong here. They are smaller and more brightly metallic than the *caeruleus* group; other differences are indicated in the description above. An indication of their relationship to *L. (S.) caeruleus* is the reduced inner tooth of the claw of the female; the tooth is absent in *caeruleus*.

Comments: The sternal scopa of the *L. caeruleus* group is reasonably convincing as a scopa, although the hairs are shorter and more erect than in *Reedapis*. In the *L. cyaneus* group the hairs are still shorter and sparser, although in one of the two females available they are largely covered by a dense mass of pollen, showing that they function as a scopa.

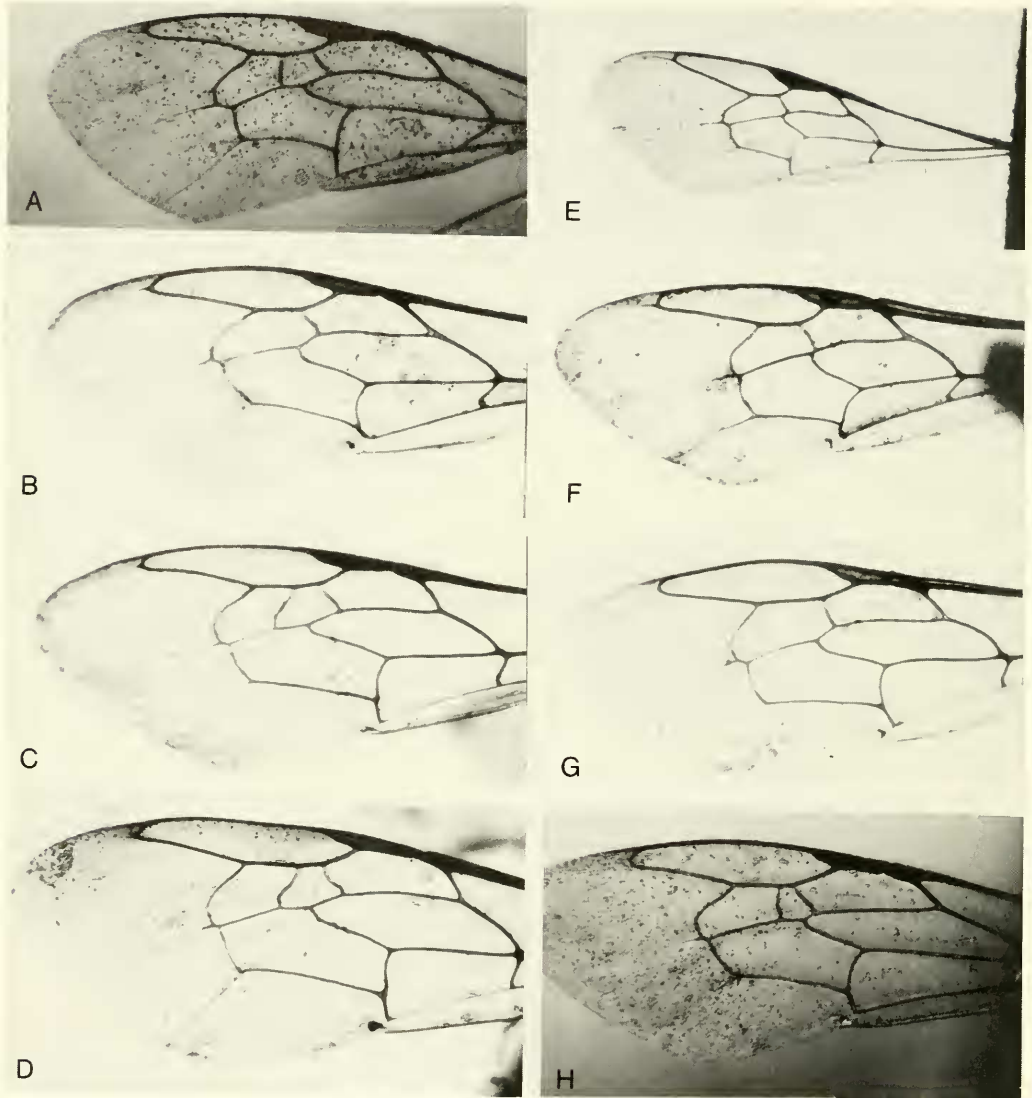


FIG. 16. Forewings. a. *Leioproctus* (*Torocolletes*) *fazi* (Herbst). b. *L.* (*Hexantheda*) *missionica* (Ogloblin). c. *L.* (*Reedapis*) *bathycyaneus* Toro. d. *L.* (*Cephalocolletes*) *laticeps* (Friese). e. *L.* (*Protodiscelis*) *palpalis* (Ducke)? f. *L.* (*Tetraglossula*) *fucus* n. sp. g. *L.* (*Spinolapis*) *caerulescens* (Spinola). h. *L.* (*Nomocolletes*) *joergenseni* (Friese).

Subgenus *Nomocolletes* Brèthes

Nomocolletes Brèthes, 1909:455. Type species: *Nomia jörgenseni* Friese, 1908, by original designation. *Leioproctus* (*Nomocolletes*); Michener, 1965:41.

In spite of its distinctive appearance due to the enamel-like metasomal bands, *Nomocolletes* is similar to *Perditomorpha* although with three submarginal cells. The modified hind legs of most males suggest *Pygopasiphae* but are quite different and no doubt independently evolved features. As

in *Reedapis*, *Cephalocolletes*, and some *Spinolapis*, there is a distinct row of hairs on the front basitarsus of the female. (Figs. 16h, 17, 18)

Description: Agreeing with usual (rather than exceptional) characters listed for *Perditomorpha* except as follows: a. Metasoma black, in male broad like that of female (except for *L. simplicicrus*), posterior margins of T1-4 of female, T1-5 or 6 of male with smooth, hairless, shiny apical bands of enamel-like green, yellowish, or whitish, punctate and hairy basally in *L. simplicicrus*. Length 10-12.5 mm; 8 mm in *L. simplicicrus*. Pubescence largely pale,

with or without black on vertex and dorsum of thorax; with dusky or black on posterior part of metasoma; not forming pale metasomal hair bands. f. Ocelli in front of summit of convex vertex, anterior margin of median ocellus in front of or near midpoint between antennal bases and posterior edge of vertex. g. Male flagellum reaching middle of tegula, middle segments longer than broad, or in *L. simplicicrus* reaching scutellum with middle segments 1.5 times as long as broad. h. Propodeum with base sloping, much

shorter than metanotum, so that profile of propodeum is mostly steeply declivous; propodeal triangle smooth except in *L. simplicicrus*, marginal line pitted or not. i. *Anterior basitarsus of female with well-formed row of hairs along outer margin*. Basitibial plate pointed (both sexes); male with narrow, smooth, shining, hairless ridge from behind basitibial plate to apex of tibia, or in *L. simplicicrus* with strong but hairy carina originating near apex of basitibial plate. j. Femoral and tibial scopa well developed, white or yellow, sometimes

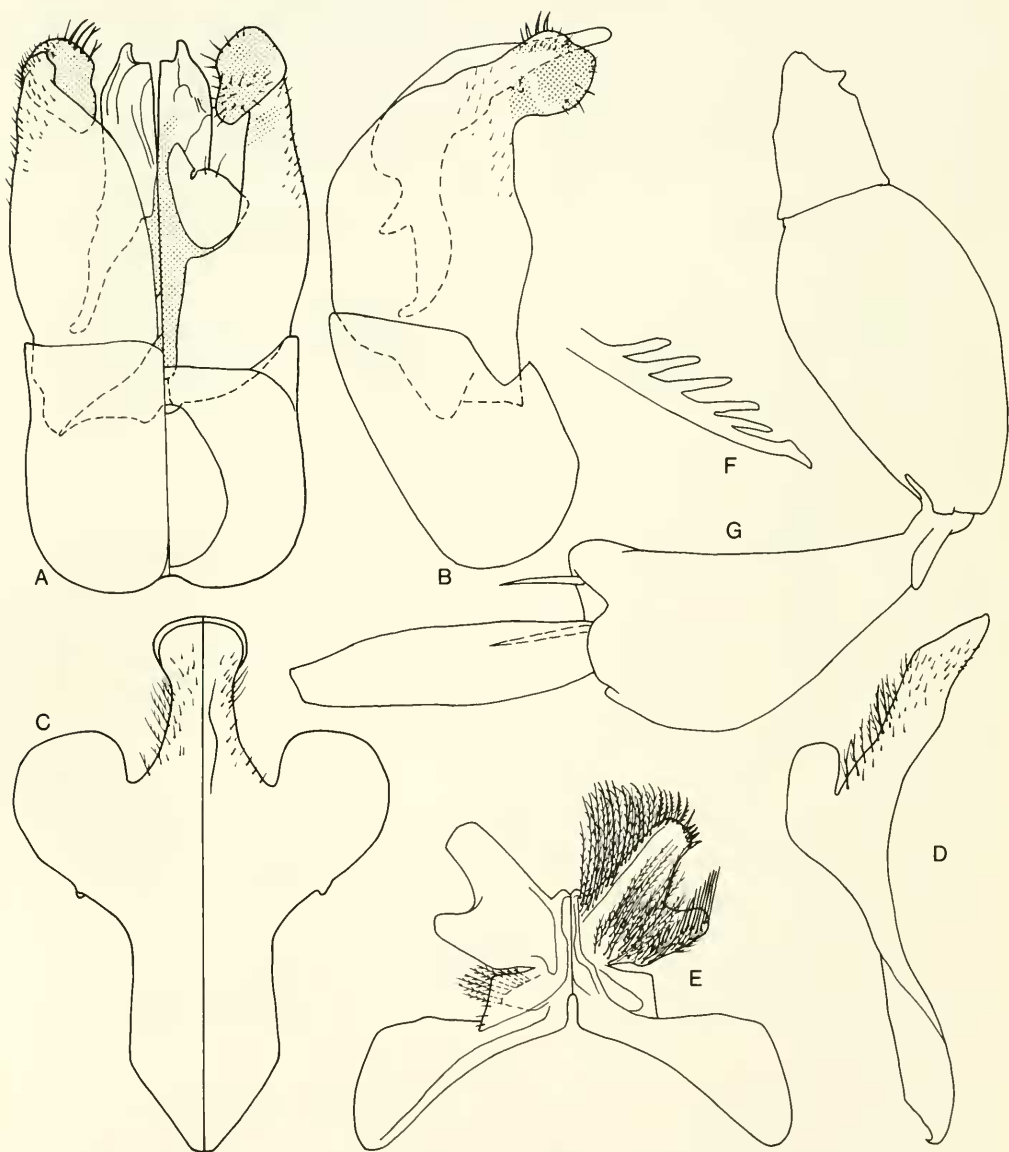


FIG. 17. *Leioproctus (Nomiocolletes) joergenseni* (Friese). a-e. Genitalia, S8 and S7 of male. f. Inner hind tibial spur of female. g. Hind leg of male.

blackish along upper margin of tibia; femoral corbicula with a few hairs arising from its surface; hairs on anterior side of corbicula abundant, long but not curled, form as in *Perditomorpha*; hairs on posterior side of corbicula abundant, mostly simple except for few branched ones adjacent to basal half of corbicula; trochanteral hairs loosely plumose. Tibial scopa well developed, hairs of lower part as in most *Perditomorpha*, grading toward upper margin to hairs with the rachis much exceeding moderately long lateral branches. k. Hind femur of male swollen and hind tibia broadened apically (Fig. 17g) except in *L. simplicicrus* which has slender, unmodified hind legs. l. Wing hairs on basal half of wing longer than on distal part of wing; three submarginal cells, basal vein of forewing meeting or basal to cu-v except distal to cu-v in *L. simplicicrus*; jugal lobe of hind wing reaching level of cu-v or not attaining that level in *simplicicrus*. m. S2-4 of female with apical bands of suberect, mostly simple hairs less than half as long as sterna; S5 with apical band of plumose hairs. S6 of male unmodified, posterior margin

with shallow median concavity. T7 of male without pygidial plate, with sparsely hairy, shiny longitudinal median zone which is widest anteriorly, through which runs longitudinal median ridge except in *L. simplicicrus*. n. S7, S8, and genitalia as in Figs. 17, 18. S7 with three or four lateral apical lobes, (two in *simplicicrus*), distal one with coarse apical teeth (except in *simplicicrus*); process of S8 directed somewhat downward, spiculum rather long, acute; apex of gonoforceps (except in *simplicicrus*) directed downward and mesad, perhaps a gonostylus separated from gonocoxite except on lateral surface, largely membranous.

Distribution: From Bolivia and central Argentina (Rio Negro) to the northeast of Brazil (Ceará), mostly in xeric areas, with the odd species, *L. simplicicrus*, in Perú.

Included species: *Leioproctus (Nomiocolletes) arnau* (Moure, 1949); **cearensis* (Ducke, 1908) [*Nomia*]; **jenseni* (Friese, 1906); *joergenseni* (Friese, 1908) [*Nomia*]; and *simplicicrus* Michener, n. sp.

Comments: As is obvious from the above de-

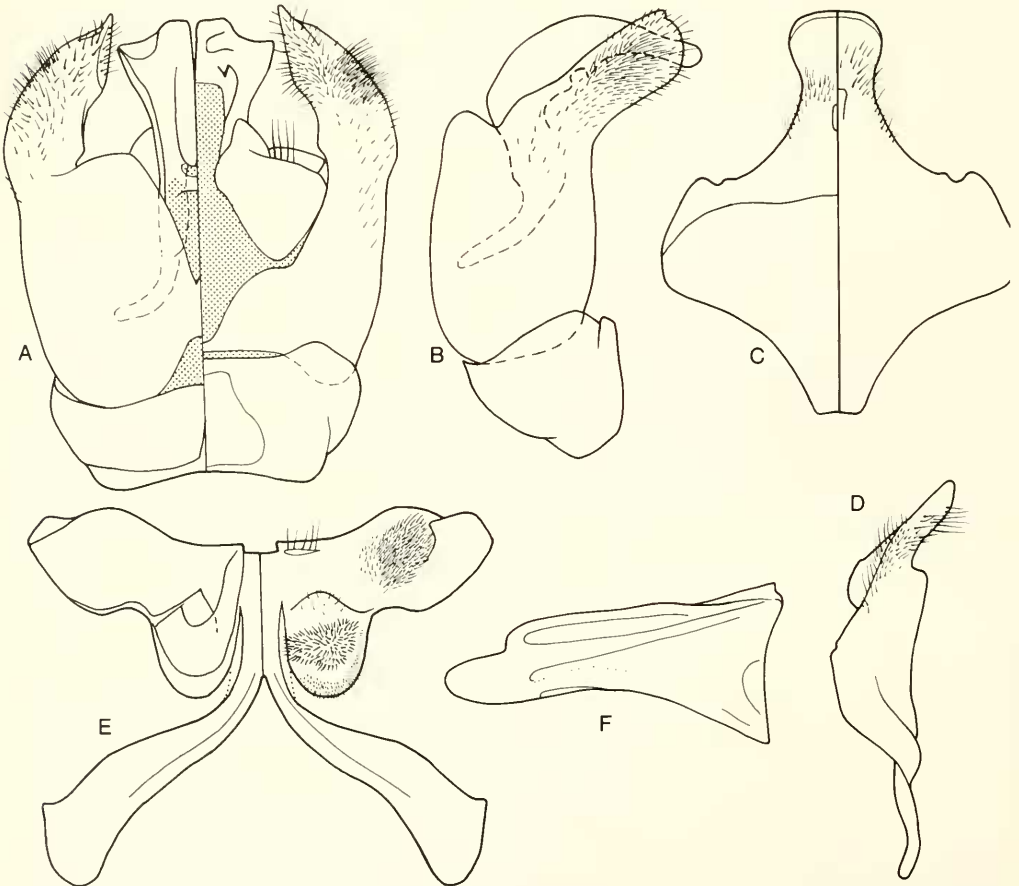


FIG. 18. *Leioproctus (Nomiocolletes) simplicicrus* n. sp., male holotype. a-e. Genitalia, S8 and S7. f. Mandible.

scription, *L. simplicicrus* is quite different in numerous characters from the other species of the subgenus. The female might further emphasize the difference from other *Nomiocolletes*; it must be noted that in the above description characters recorded for females are based only on the other species for the female of *L. simplicicrus* is unknown. There are enough similarities between that species and the others to suggest that they are sister groups. If one ignores the tergal banding, elaborate S7, and hind tibial carina of the male, characters that indicate its association with *Nomiocolletes*, *L. simplicicrus* agrees best with such relatively plesiomorphic subgenera as *Chilicolletes*.

Genus *Brachyglossula* Hedicke

Brachyglossa Friese, 1922:577 (not Boisduval, 1829, and

others). Type species: *Brachyglossa rufocerulea* Friese, 1922 (monobasic).

Brachyglossula Hedicke, 1922:427 (replacement for *Brachyglossa* Friese). Type species: *Brachyglossa rufocerulea* Friese, 1922 (autobasic).

Leioproctus (*Brachyglossula*); Michener, 1965:41.

This genus of large, dark haired, unbanded bees is distinctive in appearance [except for the superficially similar *Leioproctus* (*Cephalocolletes*) *laticeps*]. In some major features such as the vestiture and form of the hind basitarsus of the female and the shape of the process of S8 of the male, *Brachyglossula* resembles *Leioproctus*. The italicized characters in the description are sufficiently marked and unique, however, to support recognition at the genus level even though the result at least for the time being is a paraphyletic

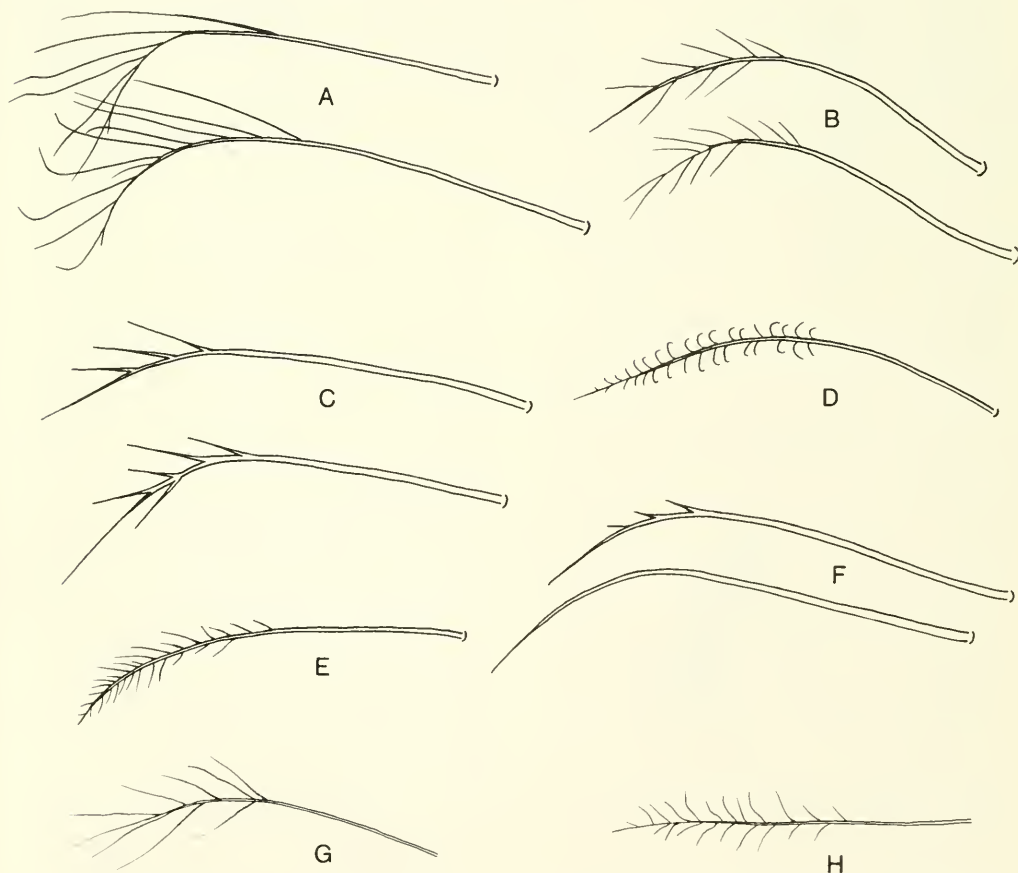


FIG. 19. a-g. Hairs from the lower part of the tibial scopa. a. *Leioproctus* (*Perditomorpha*) *erithrogaster* Toro and Rojas. b. *L.* (*Perditomorpha*) *bruneri* (Ashmead). c. *L.* (*Leioproctus*) *fulvoniger* n. sp. d. *L.* (*Glossopasiphae*) *plaumanni* n. sp. e. *L.* (*Protodiscelis*) *palpalis* (Ducke)? f. *L.* (*Pygopasiphae*) *wagneri* (Vachal). g. *L.* (*Reedapis*) *bathycaneus* Toro. h. Hair from sternal scopa of *L.* (*Reedapis*) *bathycaneus* Toro.

genus *Leioproctus* (see section on Relationships Among Paracolletine Bees). (Figs. 20, 31a)

Description: 1. Integument black or metallic blue, metasoma sometimes red. Length 12-16 mm. Vestiture largely black, metasomal hair bands completely absent. 2. Face rather flat, *supraclypeal area not elevated above frons* or other adjacent areas. *Inner orbits diverging below*. Malar space short. Clypeus somewhat protuberant, punctured throughout. 3. Facial fovea as described for *Lonchopria*. 4. Head often markedly convex both in front of and behind ocelli; vertex convex seen from front; development of vertex behind ocelli variable, so that anterior margin of median ocellus is behind to in front of midpoint between antennal bases and posterior margin of vertex. Preoccipital carina absent. 5. Mandible of female with strong preapical tooth on upper margin, of male with that tooth broad and weakly to

strongly emarginate so that mandible is at least weakly tridentate. 6. Labrum of female at least four times as wide as long, almost entirely a broad, shiny convexity, with a strong transverse carina before declivity to depressed margin; apical depressed margin narrow, apical fringe much longer than labrum. Labrum of male two to three times as wide as long, smooth, shining, flat or with lateral basal convexities, without usual transverse convexity; apical margin weakly concave to straight, apical fringe slightly to much longer than labrum. 7. Proboscis without unusual features except long palpi; labial palpus over half as long as prementum; maxillary palpus with last four segments beyond apex of galea. 8. Male flagellum short, reaching pronotal lobe, middle segments much broader than long. 9. *Propodeum almost entirely steeply declivous in profile*, only upper margin sometimes slanting; posterior part of thoracic dorsum is the convex metanotum, posterior

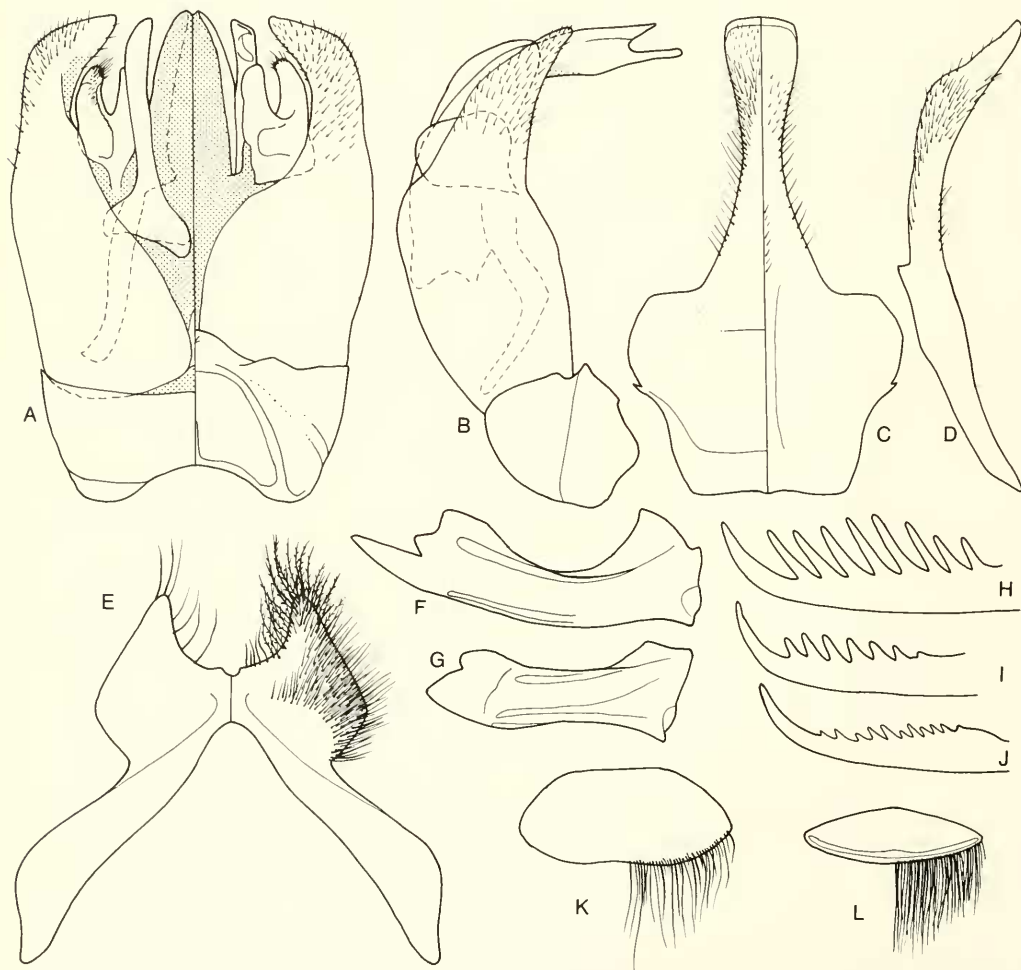


FIG. 20. *Brachyglossula bouvieri* (Vachal). a-e. Genitalia, S8 and S7 of male. f, g. Mandibles of male and female. h, i. Inner hind tibial spur of female, inner and outer margins. j. Inner margin of inner spur of male. k, l. Labrum of male and female.

margin of which is vertical; propodeal triangle shining, finely roughened, marginal line weakly pitted anteriorly, not pitted posteriorly. 10. Front basitarsus of female hairy, without well developed comb. 11. *Middle and hind tibial spurs strongly curved, coarsely pectinate* with long teeth in female (inner margin of inner hind spur, outer margin of outer hind spur, outer margin of middle spur; other margins coarsely serrate); teeth shorter in male, inner margin of inner hind tibial spur nearly edentate in some males. 12. Femoral and trochanteral scopa not well developed, hairs little longer than femoral diameter; tibial scopa rather short, not hiding surface, longest hairs on lower margin of tibia, these not curled upward or scarcely so; all scopal hairs with strong axes and *fine side branches at more or less right angles to axes* except that posterior to femoral corbicula branches are short, inconspicuous and directed apicad and on upper part of tibial scopa hairs are dense with apically directed branches. Keitrichia of female of moderate length, well differentiated from other tibial hairs, of male ordinary. 13. Hind basitarsus of female slender, scarcely tapering apically, *apex more than half as wide as width near base*, outer surface rather flat; hairs of outer surface longer than those of inner surface, especially basally. *Hind basitarsus of male scarcely wider than apex of second tarsal segment*. 14, 15. Basitibial plate about one fifth as long as tibia or in males even shorter, defined by carinae, rounded at apex and covered by hair except marginally in female, apex narrowly rounded in male and surface hairy but not hidden; no carina extending apicad. 16. Wings hairy throughout or basal cells partly bare, all hairs minute; two submarginal cells; basal vein meeting or basal to cu-v. Stigma small, costal margin of marginal cell 2.5 to 3 times as long as stigma which is not broader than prestigma (measured to wing margin), *vein r arising well beyond middle*, margin within marginal cell slightly convex. Apex of marginal cell as described for *Lonchopria*. 17. Jugal lobe of hind wing reaching level of cu-v. 18. *T1 markedly narrower than T2*, in female about three fourths and in male two thirds width of T2. S2-5 of female with well developed, dense, plumose scopa, hairs with numerous fine side branches more or less at right angles to axes. 19. S6 of male unmodified, apical margin rounded or with small median emargination. Pygidial plate of male absent but T7 with longitudinal, median, shiny line. Pygidial plate of female with apex narrowly rounded, lateral margins diverging strongly anteriorly, nearly straight. 20-22. S7, S8, and genitalia of male as in Fig. 20. *S7 with a single apicolateral lobe; S8 without usual ventral bump*, apical process as in *Leioproctus* Group. Gonocoxite attenuate apically, this position possibly a gonostylus; *volsella vertically expanded, reaching dorsum of genital capsule, deeply bifid in dorsal or ventral view; penis valve strongly curved downward and deeply bifid apically, distal part free from penis which is broadly sclerotized laterally*.

Distribution: Bolivia and Argentina (provinces of Misiones, Jujuy, La Rioja, Catamarca, etc.). Some and perhaps all visit flowers of Cactaceae.

Included species: *Brachyglossula boliviensis* (Vachal, 1901) [*Pasiphae*], new combination; *bouvieri* (Vachal, 1901) [*Pasiphae*]; *personata* (Cockerell, 1939) [*Pasiphae*]; and *rufocerulea* (Friesse, 1922) [*Brachyglossa*]. There seem to be a few other species, evidently undescribed.

Genus *Niltonia* Moure

Niltonia Moure, 1964:52. Type species: *Niltonia virgiliti* Moure, 1964, by original designation.

The extremely long labial palpi are the outstanding feature of this genus but this is by no means a *Leioproctus* with long palpi, as shown by a whole series of other unique features italicized in the description below. (Figs. 21, 31b; Fig. 1, Moure, 1964; Figs. 1-3, Laroca and Almeida, 1985).

Description: 1. Integument black, nonmetallic. Length 10-12.5 mm. Vestiture of female largely black, of male mostly gray, metasomal hair bands completely absent. 2. Supraclypeal area not much elevated above frons or clypeus. Inner orbits converging below. Malar space short. Clypeus convex, protuberant (less than eye width), punctured throughout. 3. Facial fovea as described for the *Lonchopria* group. 4. Head strongly biconvex in front of ocelli; vertex convex behind ocelli and seen from front; anterior margin of median ocellus behind midpoint between antennal bases and posterior margin of vertex. Preoccipital carina absent. 5. Mandible with preapical tooth on upper margin. 6. Labrum about four times as wide as long with strong median elevation over one third as wide as labrum in female, less than one third as wide in male; apical margin feebly convex, apical fringe much longer than labrum. 7. Proboscis short, galea rounded at apex, glossal lobe much shorter than basal width; *labial palpus enormous, 8-9 mm long, in repose reaching S3 or S4, fourth segment much longer than first three together, tapering, often extended beyond apex of metasoma, irregularly toothed* (Fig. 1 of Moure, 1964; Fig. 3 of Laroca and Almeida, 1985); maxillary palpus with last three segments beyond apex of galea. 8. Male flagellum short, reaching pronotal lobe, middle segments longer than broad. 9. Propodeum mostly steeply declivous in profile but with slanting basal zone shorter than metanotum; propodeal triangle finely roughened, marginal line not pitted. 10. Front basitarsus of female hairy, except under side abruptly only sparsely so, no well developed comb. 11. Middle and hind tibial spurs robust, curved, with numerous fine teeth, finer in male than female, longest on inner margin of inner hind spur and outer margins of middle and outer hind spurs; *inner hind tibial spur much longer than outer*. 12. Scopa on leg rather

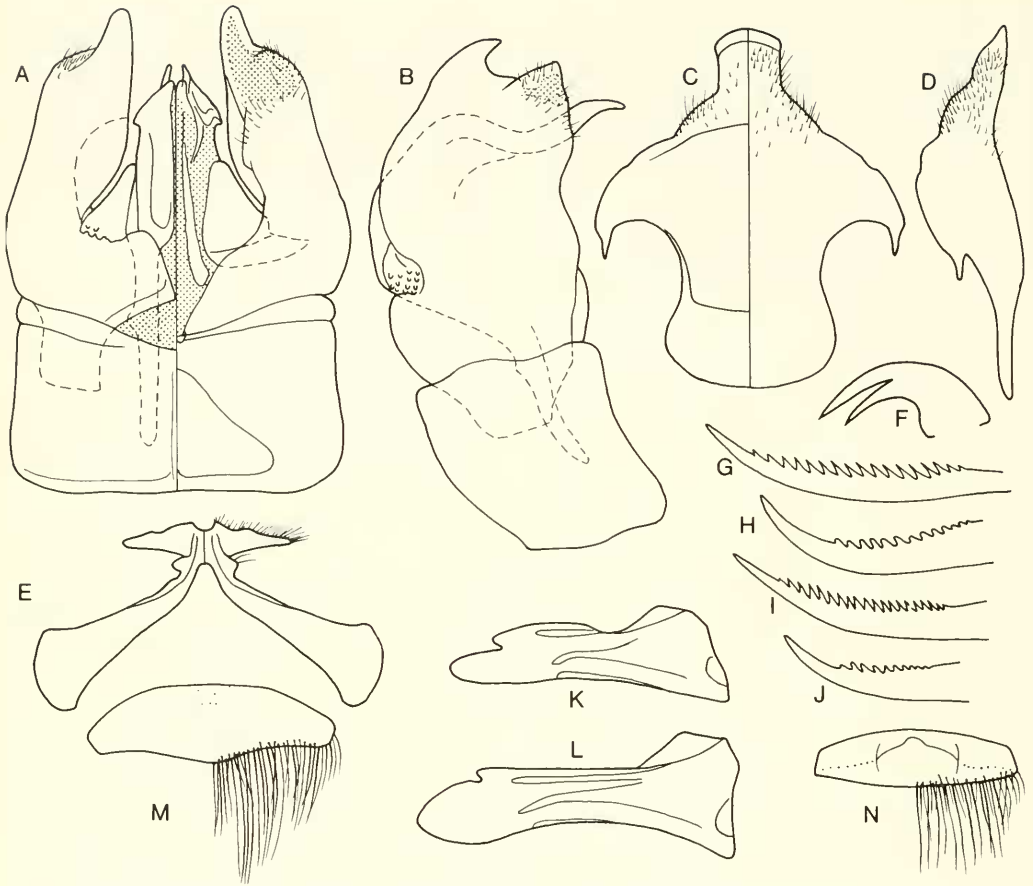


FIG. 21. *Niltonia virgilii* Moure. a-e. Genitalia, S8 and S7 of male. f. Claw of male. g, h. Inner and outer hind tibial spurs of female. i, j. Same, of male. k, l. Mandibles of male and female. m, n. Labrum of male and female.

short, hairs with major branches such that there is no distinct rachis distally except on upper part of tibia; hairs behind femoral corbicula with few branches, many merely bifid; lower hairs of tibial scopa curved distad but not upward. Keirotichia of moderate length, well differentiated from other hairs. 13. Hind basitarsus of female slender, slightly tapering apically, apex more than half as wide as width near base, outer surface flat; hairs of outer surface longer than those of inner surface. Hind basitarsus of male only slightly wider than apex of second tarsal segment. Claws (both sexes) with inner and outer rami similar in shape, slender, of almost equal length, so that claws are deeply bifid. 14, 15. Basitibial plate a little less than one third as long as tibia in female, one fourth in male, defined by carinae, almost pointed, with short hairs not obscuring surface; male with strong ridge, almost a carina but hairy, from apex of basitibial plate to apex of tibia. 16. Wings minutely hairy throughout; two submarginal cells; basal vein meeting or slightly distal to cu-v. Stigma rather small, costal

margin of marginal cell over twice length of stigma which is not broader than prestigma (measured to wing margin), vein *r* arising well beyond middle, margin within marginal cell convex. Apex of marginal cell as described for the *Lonchopria* group. 17. Jugal lobe of hind wing exceeding level of cu-v. 18. S2-5 of female with well developed scopa of hairs that have several long branches so that there is no clear rachis apically. 19. S6 of male with median, broad, shallow, shining, impunctate concavity; apical margin shallowly emarginate. T7 of male with triangular pygidial plate, sharply pointed apically, margined by carinae laterally. Pygidial plate of female rounded apically. 20-22. S7, S8, and genitalia of male as in Fig. 20a-c and Fig. 1 in Laroca and Almeida (1985). S7 with a single apicolateral lobe plus small basal membranous lobe, hairs on these lobes marginal, i.e., neither dorsal nor ventral; S8 without usual ventral bump; apical process extremely short, terminating as in *Leioproctus* group. Apex of gonoforceps bilobed; volsella with apex expanded dorsally, reaching dorsum of genital

capsule; penis valve strongly curved downward at apex, apodemes of penis valves parallel, not curved upward proximally; penis with long sclerotic strips on lower surface.

Distribution: Brazil, states of Santa Catarina to Rio de Janeiro.

Included species: *Niltonia virgilii* Moure, 1964.

Comments: In certain features *Niltonia* resembles *Brachyglossula*. The dorsally expanded volsellae and the distal origin of vein r on the stigma are the most apparent such characters. Perhaps both genera arose from a common ancestor within the *Leioproctus* group.

Lonchorhyncha new genus

Type species: *Diphaglossa ecuadoria* Friese, 1925.

The elongate clypeus and malar area (about as long as the eye) led to placement of this bee in the genus *Diphaglossa* (subfamily Diphaglossinae) where it has remained until now. No other American paracolletine has such a head. Other characters quite unlike *Leioproctus* include those of S7, S8, and the genitalia of the male, as described below. The two ventral prongs on the penis valve suggest *Lonchopria* s. str. but other characters do not indicate a close relationship to that taxon. (Figs. 22a-i, 23a-d, 31c)

Description: 1. Nonmetallic, metasomal hair bands and integumental color bands absent. Punctuation mostly fine and weak but surface, especially of head and thorax, minutely roughened and dull. 2. Face protuberant and extremely produced; upper margin of clypeus below lower ends of eyes; supraclypeal area (measured to lower margins of antennal sockets) over half as long as clypeus, longer than wide, not elevated above level of clypeus but strongly elevated above frons and paracocular area, frontal tubercle strong. Orbits subparallel in female, converging below in male. Malar space nearly as long as eye in female, slightly longer than eye in male. Clypeus convex with longitudinal median flat or slightly depressed zone but no differentiated depressed area as in most *Lonchopria*. 3. Facial foveae not recognizable although surface mesal to upper part of eye broadly concave. 4. Vertex extending only an ocellar diameter or less behind ocelli, seen from front not broadly convex, laterally (between ocelli and eye) concave and lower than summit of eye, medially a little elevated, bearing ocelli slightly higher than summit of eye. Distance from anterior margin of median ocellus to posterior margin of vertex about half of distance to antennal sockets. 5. Mandible of female short, slender medially but broadened apically, cap of rutellum large, preapical tooth on upper margin; of male slender, almost parallel sided except for broader base, with preapical tooth on upper margin. 6. Labrum of female unknown. Labrum of male over twice as wide as long; apical margin straight medially,

with long bristles; rest of labrum thickened, irregularly roughened, hairless. 7. Proboscis long but otherwise not unusual, stipes about three fourths as long as head; galeal comb of 15 bristles; apices of galeae broken off in only specimens so that length is unknown; maxillary palpus about half as long as stipes, of six subequal segments; glossa shallowly emarginate, lateral lobe about as long as broad; labial palpus over two fifths as long as prementum, segments subequal in length. 8. Antenna of male reaching base of scutellum, flagellar segment 1 < 2 + 3, nearly twice as long as broad, 2 about as long as broad, segments 3-9 ranging from less than 1.5 (seg. 3) to over 1.5 (seg. 9) times as long as wide, segment 10 over twice as long as wide. Antenna of female reaching tegula, flagellar segment 1 equal to 2 + 3, over twice as long as wide, 2 slightly broader than long, remaining segments about 1.5 times as long as broad except segment 10 which is twice as long as broad. 9. Propodeal triangle minutely roughened, nearly dull, marginal grooves not pitted, profile nearly vertical, dropping from posterior margin of metanotum which is convex but largely declivous. 10. Front basitarsus of female, on outer margin with weakly differentiated comb of hairs or bristles longer than other basitarsal hairs, hairs of comb well separated (i.e., not closely placed), tapering, curved. 11. Inner hind tibial spur of female pectinate with about 10 teeth, the middle ones longest, bases well separated; of male ciliate with many fine, rather long teeth, some nearly as long as diameter of spur. 12. Femoral scopa weak; long, rather dense, straight, loosely plumose hairs present on underside of hind trochanter and base of femur; rest of femur with only short sparse hairs on lower surface, simple on distal half; long, branched, downcurved hairs on anterior surface of female partially enclose femoral corbicula. Hind tibia (female) with long branched hairs of lower surface curved outward and upward, along with hairs of outer surface forming a strong scopa which is not so dense as to fully obscure the tibial surface; hairs of inner surface simple, moderately long, not forming zone of short keirottrichia. 13. Hind basitarsus of female slender with outer surface convex, hairs longer, finer, and sparser than those of inner surface, mostly simple but those near basal half of upper margin plumose like those of tibial scopa, not obscuring surface. 14. Basitibial plate of female well defined, strongly elevated, with shining, marginal carina; apex narrowly rounded, almost pointed; surface largely hidden by abundant short hairs. Claws with strong inner tooth. 15. Basitibial plate of male similar to that of female but hairs not hiding surface; no carina. 16. Wings hairy throughout. Basal vein slightly distal to cu-v. Stigma slender, as wide as prestigma (measured to wing margin), vein r arising near middle, margin within marginal cell slightly convex. Three submarginal cells, second and third subequal in length measured either on anterior or posterior margins. Apex of marginal cell narrowly rounded or

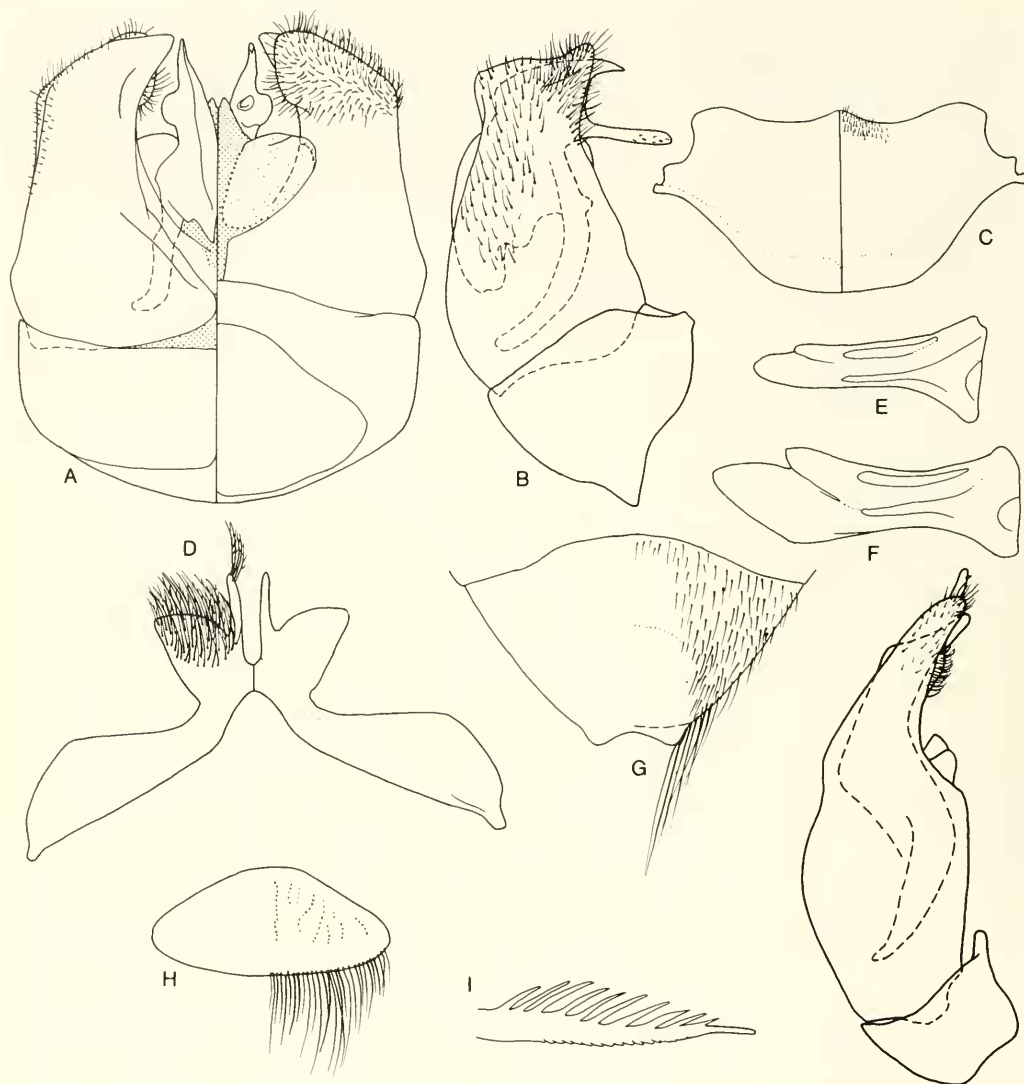


FIG. 22. a-i. *Lonchorhyncha ecuadoria* (Fries). a-d. Genitalia, S8 and S7 of male. e, f. Mandibles of male and female. g. T7 of male. h. Labrum of male. i. Inner hind tibial spur of female. j. *Eulonchopria punctatissima*, male genitalia.

pointed, separated from costal margin by three or four vein widths. 17. Jugal lobe of hind wing half as long as vannal, only two thirds as long as cell Cu, far short of level of cu-v. 18. Metasomal sterna with hair of moderate length, sparser and shorter posteriorly in male. 19. Pygidial plate of male represented by large, slightly concave, hairless area, not sharply defined except for apical emarginate flange which extends slightly beyond morphological posterior tergal margin. 20. S7 of male moderately narrowed medially, flat, with one pair of apical hairy lobes, each lobe with mesal,

posteriorly directed process. 21. S8 of male weakly sclerotized, almost quadrate, without apical process and without spiculum. 22. Male genitalia without distinct gonostylus, gonoforceps robust. *Volsella* largely membranous, weakly sclerotized only laterally, without denticles. Penis valve compressed, down-curved at apex and with long median process projecting downward.

Distribution: Ecuador.

Included species: *Lonchorhyncha ecuadoria* (Fries, 1925). An account of the species is included in the Appendix.

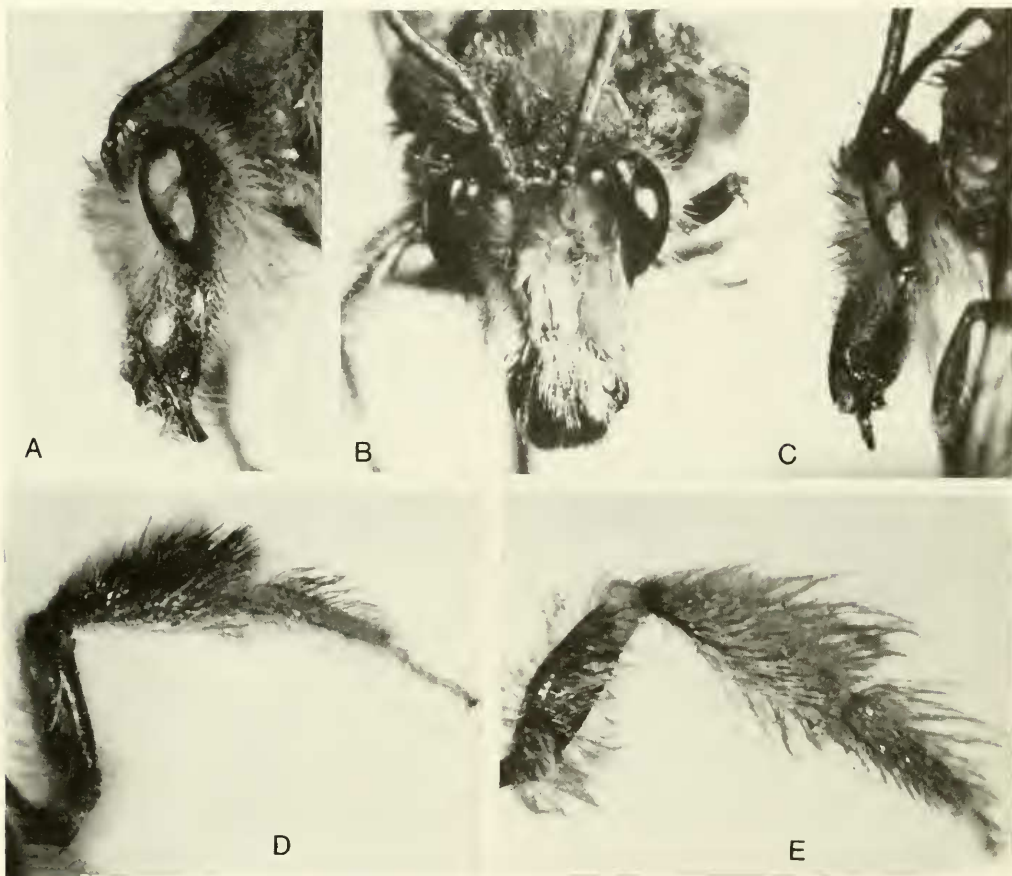


FIG. 23. a-d. *Lonchorhyncha ecuadoria* (Friese). a. Head of female (type). b, c. Head of male. d. Outer side of hind leg of female. e. Outer side of hind leg of female, *Leioproctus* (*Kylopasiphae*) *pruinosus* n. sp.

Genus *Eulonchopria* Brèthes

This is a genus of coarsely punctured and sculptured bees with yellow integumental bands on some of the metasomal terga and often plaited forewings with darkened costal margins so that there is a superficial resemblance to eumenid wasps. The many unique features are italicized below.

Description: 1. Body nonmetallic, *largely coarsely punctate and coarsely sculptured; pubescence short*, in *Eulonchopria* s. str. at anterior and posterior scutal angles and often elsewhere hairs so short that each fits within a puncture and is broadly plumose. Metasomal hair bands absent but some terga with *apical integumental pale yellow bands in depressed marginal zones*. Length 7-11 mm. 2. Face convex, supraclypeal area more protuberant than clypeus. Orbits converging below. Malar space very short. 3. Facial fovea absent or deeply impressed, well defined in both sexes, elongate, low on face (not reaching summit of eye). 4.

Vertex convex and elevated far above upper ocular tangent seen from front. Anterior margin of median ocellus near or in front of midpoint between antennal bases and posterior margin of vertex. *Preoccipital carina strong, often lamella-like*. 5. Mandible (male and female) with preapical tooth on upper margin. 6. Labrum much broader than long with apical margin convex. 7. Proboscis without unusual features; labial palpus about one third as long as prementum; maxillary palpus with last one to two segments extending beyond apex of galea. 8. Antenna of male reaching scutellum, middle flagellar segments usually less than twice as long as broad. 9. *Pronotum dorsolaterally with strong transverse carina or lamella extending onto lobe*. Metepisternal area deeply impressed and almost hairless. Propodeal triangle with large, deep pits; *some ridges margining pits produced, lamella-like or tooth-like*. Horizontal base of propodeum as long as or shorter than metanotum, less than one third as long as vertical surface in profile, *horizontal and vertical surfaces separated by sharp angle or lamella*.

10. *Front basitarsus of female with outer apical process from which comb extends basad on outer edge of basitarsus.* 11. Inner hind tibial spur of female coarsely pectinate (3 to 5 teeth); of male coarsely toothed or ciliate or hind tibial spurs completely absent. 12. Femoral scopa of rather short, curved hairs *densely plumose toward apices**. *Hind tibia with hairs of outer surface short and not scopa-like, especially on distal half of tibia, hairs of lower margin and inner surface longer, on inner surface (except basally) not plumose but not forming zone of short keirotichia.* 13. Hind basitarsus of female elongate, tapering, apex more than half as wide as maximum width near base, outer surface slightly concave below upper margin; hairs as long as or shorter than those of inner surface, not very different from those of outer surface of tibia, not obscuring surface. 14. Basitibial plate of female well defined, pointed or rounded apically, *about one third as long as tibia.* 15. Basitibial plate of male well defined, carina extending to apex of tibia. 16. *Forewing commonly folded longitudinally (as in Vespidae)* (see Danforth and Michener, 1988). Basal vein distal to or meeting cu-v. Stigma nearly parallel sided, *vein r arising near apex* and part of margin within marginal cell oblique, not convex. Three submarginal cells. Apex of marginal cell obliquely bent away from wing margin or obliquely truncate. 17. Jugal lobe of hind wing variable. 18. Metasomal sternal hairs (both sexes) usually extremely short. *Prepygidial fimbria of female strongest medially, fading away laterally.** 19. *Pygidial plate of female with margin continued basolaterally nearly to lateral margin of T6, isolating depressed area on which pygidial fimbria arises.* Pygidial plate of male absent, *surface of T7 extremely coarsely punctate* (like preceding terga). 20. S7 of male narrow medially, with two or three pairs of broad lobes distally, *these lobes bent so that hairs are on ventral surfaces.* 21. S8 of male rather large and broad, with broad basal spiculum and broad apical region, sometimes continued as small apical process which is flat, not beveled like a pygidial plate, at apex. 22. *Male genitalia sometimes with distinct slender gonostylus.* Volsella small, without distinct denticles. Penis valve not strongly downcurved apically, with preapical lobes or processes on inner margin.

Distribution: Arizona to Argentina, mostly in xeric or savanna areas. It occurs principally from central Brazil to Argentina and Bolivia and from Oaxaca through western Mexico to Arizona. It has also been collected in Nicaragua and Venezuela. It is the only paracolletine in North America.

Comments: Characters marked by an asterisk in the above description have not been verified for the subgenus *Ethalonchopria*.

This is a genus of remarkable bees, with numerous distinctive characters italicized above. Most of these characters are unusual among bees, not shared by potential outgroups (*Leioproctus* and Colletidae other than Paracolletini) and are ap-

omorphies. The deep, rather slender, bare, well defined facial foveae (one subgenus), however, are shared with the Australian paracolletine *Cal-lomelitta* and with other colletid subfamilies such as Hylacinae. This is probably a plesiomorphy. Likewise the distinct, slender, male gonostyli of some species, unique for the Colletidae, are a possible plesiomorphy. Its apparently disjunct distribution (absent in wet tropics) combined with its unusual characters and the diversity of the species suggest that *Eulonchopria* is an archaic group that possesses many specialized features.

Recent studies of the genus are by Michener (1963, 1985). Genitalia and hidden sterna of males are illustrated in the first paper listed. An additional illustration of genitalia is included herein to provide a needed lateral view.

KEY TO THE SUBGENERA OF *EULONCHOPRIA*

1. Facial fovea absent; anterior and lateral surfaces of mesepisternum not separated by carina *Ethalonchopria*
- Facial fovea distinct; anterior and lateral surfaces of mesepisternum separated by carina. *Eulonchopria* s. str.

Ethalonchopria new subgenus

Type species: *Apista gaullei* Vachal, 1909.

This subgenus differs in many features from the other subgenus. In nearly all of the subgeneric characters it is less strange than *Eulonchopria* s. str., i.e., more like other paracolletines. Noteworthy are the punctate and only slightly concave foveal areas on the face, so that distinct foveae are absent, and the simple axillae. (Michener, 1985, Fig. 1)

Description: a. Facial fovea absent. b. Preoccipital carina strong but not a lamella. c. Ridge mesal to posterior ocellus absent. d. Base of labrum convex in female, binodulose in male. e. Margin of dorsolateral pronotal carina straight. f. Anterior and lateral surfaces of mesepisternum not separated by carina. g. Axilla not produced and angulate posteriorly. h. Margins of basitibial plate largely hidden by hair in female; carina on upper margin of hind tibia of male not toothed. i. First submarginal cell longer than second plus third (measured on posterior margins), second very small. Basal vein of forewing meeting cu-v. j. Jugal lobe of hind wing extending little more than half way from base to level of cu-v. k. Apex of T7 of male entire.

Distribution: Bolivia; Santa Catarina, Brazil.

Included species: *Eulonchopria* (*Ethalonchopria*) *gaullei* (Vachal, 1909) and *limbella* (Vachal, 1909),

which may be the same species (see Michener, 1985).

Comments: The above description is based on a single male from Santa Catarina, Brazil, kindly loaned by T. L. Griswold [Logan] and on my earlier observations of the female types (the only known specimens) of the two nominal species from Bolivia (Michener, 1985). No females were available for supplementary observations. The male is clearly a member of this subgenus but its species is uncertain since there are no associated females.

Etymology: The subgeneric name is based on the Greek *ethas*, ordinary, plus the generic name *Lonchopria*, with reference to the fact that these are more ordinary bees than the other *Eulonchopria*.

Subgenus *Eulonchopria* Brèthes s. str.

Eulonchopria Brèthes, 1909:247. Type species: *Eulonchopria psathyroides* Brèthes, 1909 (monobasic).

This subgenus contains the more ornate and extraordinary members of the genus. The carinate mesepisterna and produced and angulate axillae are unique among Paracolletinae. (Fig. 22j; Figs. 1-15, Michener, 1963; Fig. 3, Danforth and Michener, 1988)

Description: a. Facial fovea of female distinct. b. Preoccipital carina forming a strong lamella. c. Brow-like ridge mesal to posterior ocellus distinct to absent. d. Base of labrum binodulose. e. Margin of dorsolateral pronotal carina convex. f. Anterior and lateral surfaces of mesepisternum separated by angle that is carinate above. g. Axilla slightly produced and angulate posteriorly. h. Margins of basitibial plate fully exposed in both sexes; carina on upper margin of hind tibia of male toothed. i. First submarginal cell about as long as second plus third (measured on posterior margins). Basal vein of forewing beyond cu-v. j. Jugal lobe of hind wing nearly attaining level of cu-v. k. Apex of T7 of male bilobed or bidentate.

Distribution: Argentina (Tucumán Province) and Paraguay to Brazil (states of Santa Catarina to Minas Gerais); Venezuela; Nicaragua; Mexico (states of Oaxaca to Sonora), U.S.A. (southern Arizona). Floral records on labels and my observations near Chamela, Nayarit, Mexico, indicate that *E. punctatissima* and *oaxacana* may be oligolectic visitors to flowers of *Acacia*.

Included species: *Eulonchopria* (*Eulonchopria*) *oaxacana* Michener (1963), *psathyroides* Brèthes (1909), and *punctatissima* Michener (1963). There appear to be additional South American species.

Comments: *Eulonchopria* s. str. contains two species groups. In the South American *E. psathyroides* and its undescribed relatives the hind tibial spurs of the male are present, the brow-like ridge mesal to the posterior ocellus is strong, S8 of the

male lacks an apical process, and there are no slender male gonostyli. In the two North American species, *E. punctatissima* and *oaxacana*, the hind tibial spurs of the male are absent, the brow-like ridge mesal to the posterior ocellus is weak to absent, S8 of the male has a small, apically expanded process, and there is a slender, well defined genital process, probably the gonostylus.

Genus *Lonchopria* Vachal

The very dense tibial scopae of the female, contrasting with short, sparse, simple or restrictedly plumose hairs on the outer side of the hind basitarsus, is the most striking distinction from other American paracolletines. *Lonchopria* (*Lonchoprella*) is an exception to this character, however. Other characters italicized below also distinguish *Leioproctus* and *Lonchopria*. Males of *Lonchopria* differ from those of *Leioproctus* in the lack of a beveled apex of the process of S8. In *Leioproctus* the apex of the process of S8 is exposed, beveled, and superficially resembles a pygidial plate. The subgenus *Ctenosibyne*, which clearly is related to the subgenus *Lonchopria*, has an apex of the process of S8 that seems suggestive of that of *Leioproctus*. It is, however, broad, thin, and hairy, as in some species of the subgenus *Biglossa*, and is in reality not like that of *Leioproctus*.

Description: 1. Integument black or metallic bluish, metasomal hair bands present or absent, terga without colored integumental bands. Length 7-15 mm. 2. Face flat to moderately convex, supraclypeal area not much elevated above clypeus but elevated above frons. Inner orbits converging below. Malar space very short. Clypeus commonly with depressed, median closely punctate area, lateral and distal to which are more shining convex areas (not so in *Lonchopria* s. str.). 3. Facial fovea not recognizable or indicated only by broad, undefined area of slightly different texture than rest of face. 4. Vertex weakly convex seen from front to strongly convex and elevated well above upper ocular tangent. Anterior margin of median ocellus variable in position. Preoccipital carina absent. 5. Mandible of female and most males slender with preapical tooth on upper margin (two such teeth in male of one species of subgenus *Biglossa*, commonly with apex in male broadened by expansion of lower margin or with process on lower margin). 6. Labrum variable, usually less than three times as wide as long. 7. Proboscis without unusual features or glossa moderately [L. (*Biglossa*) *robertsi*] to greatly (*Porterapis*) elongate and deeply bifid; labial palpus about one third as long as prementum (longer in *Lonchoprella*); maxillary palpus with little more than last segment (if any) extending beyond apex of galea, which is short (or most of last two segments exceeding galea in *Lonchoprella*). 8. Antenna of male reach-

ing tegula or beyond, middle flagellar segments 1.5 to over 2 times as long as broad. 9. Propodeal triangle smooth or finely transversely wrinkled, dull to shining; base of propodeum sloping, shorter than or equal to metanotum, curving onto declivous surface, about one third as long as declivous surface in profile. 10. Front basitarsus of female with comb of hairs on outer margin. 11. Inner hind tibial spur of female pectinate with four to eight very long teeth, their bases about as close as they can be so that they diverge from a sometimes somewhat thickened part of spur; of male ciliate with many fine and somewhat elongate teeth. 12. Femoral scopa of abundant, long hairs with numerous fine side branches, femoral corbicula closed basally by similar long, curved, plumose hairs arising on trochanter almost like flocus of *Andrena*. Hind tibia (female) with hairs of lower surface curled outward and upward, along with hairs of outer surface forming dense scopa of long, branched hairs usually entirely obscuring tibial surface, many of hairs lacking a single strong rachis but with several branches of more or less equal length, as in *Leioproctus* (*Perditomorpha*) (Fig. 19a) but often with more branches; hairs of inner surface of hind tibia simple, moderately long to long, not forming zone of short keitrichia. (*Lonchoprella* is an exception to most scopal characters; see description below.) 13. Hind basitarsus of female tapering toward extreme apex which is only about half as wide as width near base. Hind (also middle) basitarsus of female with outer surface usually slightly longitudinally concave below upper margin, vestiture entirely different from that of tibia, hairs short, not longer than those of inner surface [or slightly longer in *L. (Biglossa) nivosa* and *Lonchoprella*], not obscuring surface. (Hairs of upper margin of hind basitarsus long, not to be confused with those of outer surface). 14. Basitibial plate of female well defined but often hidden by hair, pointed or rounded, about one fourth as long as tibia or less. 15. Basitibial plate of male well defined at least on posterior margin and apex; no carina extending apicad. 16. Wing vestiture variable; three submarginal cells; basal vein distal to or occasionally meeting cu-v. Stigma slender, not or little broader than prestigma (measured to wing margin), somewhat broader in the subgenus *Porterapis*; marginal cell less than 2.0 to 2.5 times as long as stigma; vein r arising near middle of stigma, margin within marginal cell convex, usually somewhat angulate. Apex of marginal cell narrowly rounded or pointed, separated from wing margin by a few vein widths. 17. Jugal lobe of hind wing not attaining to surpassing level of cu-v. 18. Metasomal sterna with abundant short hair and apical fringes of longer hair. 19. Pygidial plate of male absent or represented by ill-defined elevated area that tapers toward apex of T7 which is rounded, truncate, or emarginate. 20. S7 of male narrow medially, with two pairs of apical lobes, one or both of which is rather narrow or small. 21. S8 of male variable, with base rounded or truncate, rarely pointed; apical process simple and pointed to large and

ornate, not beveled like a pygidial plate. 22. Male genitalia with or without recognizable gonostylus. Volsella without distinct denticles except in *Lonchoprella*. Penis valves usually large and elaborate, not strongly downcurved.

Distribution: Southern South America, north in the Andean uplift to Colombia.

Comments: This genus contains numerous species. They are diverse in appearance, ranging from rather small forms superficially not easily distinguished from small or middle-sized *Leioproctus* to large and easily recognized forms like *Lonchopria* s. str.

KEY TO THE SUBGENERA OF *LONCHOPRIA*

1. Mandible of male with large tooth or process on lower margin. Clypeus of female without or with weakly differentiated closely punctate upper median area; lateral clypeal area, if differentiated, merely less closely punctate than upper median area 2
- Mandible of male often with obtuse preapical angle on lower margin but without large tooth or process. Clypeus of female with flat or depressed, relatively closely punctate, upper median area contrasting with impunctate or sparsely punctate, convex, U-shaped lateral and apical region 3
2. Pollex tooth of male mandible enormous, separated from apical part of mandible (rutellum) by curved emargination (Fig. 30e); S8 of male with apical process downcurved, apex expanded and quadrangular; mandible of female unusually slender (Fig. 30g), preapical (pollex) tooth weakly developed. *Ctenosibyne*
- Pollex of male mandible not forming the usual preapical tooth; S8 of male with apical process short, pointed, scarcely downcurved; mandible of female more robust with well developed preapical tooth. *Lonchopria* s. str.
3. Glossa deeply bifid, each lobe longer than prementum; apex of mandible scoop-shaped (Fig. 29i, j), preapical (pollex) tooth reduced in female, absent in male *Porterapis*
- Glossa of the usual bilobed form (sometimes rather deeply so), each lobe less than one third length of

- prementum; apex of mandible pointed, usually with strong pollex tooth (which is sometimes double) . . . 4
4. Female with tibial scopal hairs sparse (as in *Leioproctus*), not hiding surface, which is therefore not greatly different from that of basitarsus; body length 7.5-9 mm; jugal lobe of hind wing reaching or surpassing cu-v, over two thirds as long as vannal lobe measured from wing base *Lonchoprella*
- Female with tibial scopal hairs extremely dense, hiding tibial surface, which therefore contrasts strongly with the sparsely haired basitarsus; length variable but most species over 9 mm long; jugal lobe of hind wing usually not reaching cu-v and usually less than two thirds as long as vannal lobe *Biglossa*

Lonchoprella new subgenus

Type species: *Lonchopria (Lonchoprella) annectens* new species

This subgenus differs from all other *Lonchopria* by having the tibial scopa similar to that of *Leioproctus*. It thus destroys the most conspicuous difference between the two genera, although other characters support placement of the species in *Lonchopria*. (Figs. 24, 31e)

Description: a. Nonmetallic, metasomal hair bands absent. Length 7.5-9 mm. b. Clypeus of female punctate throughout, lower two fifths and broad convex lateral area sparsely so; of male with distal third impunctate except laterally, the rest punctate, upper part of depressed median area closely punctate. c. Vertex slightly raised behind ocelli, convex; anterior margin of median ocellus almost twice as far from antennal bases as from posterior edge of vertex. d. Mandible of female not expanded ventrad preapically, lower margin uniformly curved. Mandible of male with strong preapical tooth on upper margin; lower margin with rounded preapical angle. e. Labrum of female about twice as broad as long, apex rounded; basal area strongly elevated, occupying two fifths of labrum, with strong transverse carina; of male over twice as wide as long, tapering to narrowly rounded apex, convex basal area shining, weakly binodulose, occupying half of labral length. f. Middle flagellar segments of male about 1.5 times as long as broad. g. Basitibial plate of female bluntly pointed, with hairs, marginal carinae exposed; of male hairless with carinae on both anterior and posterior margins. *Tibial scopa sparse, not hiding surface, with sparse, long*

branches; hairs of outer surface of hind basitarsus a little longer than those of inner surface so that superficially outer surfaces of hind tibia and basitarsus look similar. h. Wings with hairs sparse, especially basally. Second submarginal cell longer than third on posterior margin, receiving first recurrent vein near middle. i. *Jugal lobe of hind wing reaching or surpassing cu-v, over two thirds as long as vannal lobe.* j. T7 of male without pygidial plate, with hairless but punctate dorsal area narrowed posteriorly. k. S7 of male with three rather small apicolateral lobes on each side. l. S8 of male with downcurved apical process longer than body of sternum, hairy but not broadened or ornate distally; basal margin truncated. m. Apex of gonoforceps directed apicad, slightly vertically flattened.

Distribution: Argentina (provinces of Santiago del Estero and Catamarca).

Included species: *Lonchopria (Lonchoprella) annectens* Michener, n. sp.

Comments: *Lonchoprella* is based on a small species suggestive of *L. (Biglossa) robertsi*, but differs from that species by the scopal and hind basitarsal characters of the female which suggest those of *Leioproctus*. Other characters, including the long second submarginal cell, and the process of S8 of the male, and less diagnostically, the clypeal surface and the preapical expansion of the lower margin of the mandible of the male, are all within the range of variation found among species of *Biglossa*.

The tibial scopal characters appear to be plesiomorphic relative to other *Lonchopria*. Compared to most species of *Lonchopria* the other characters listed under g and i above are also plesiomorphic. I suppose *Lonchoprella* to be the sister group of other *Lonchopria* that retains some of the characters derived from a *Leioproctus*-like ancestor.

Subgenus *Biglossa* Friese

Biglossa Friese, 1906:374. Type species: *Biglossa thoracica* Friese, 1906, by designation of Cockerell, 1914:328.

Biglossidia Moure, 1948:313 (new synonym). Type species: *Biglossa chalybaea* Friese, 1906, by original designation.

Aeganopria Moure, 1949:442 (new synonym). Type species: *Lonchopria nivosa* Vachal, 1909, by original designation.

Leioproctus (*Biglossa*, *Biglossidia*, and *Aeganopria*); Michener, 1965:41.

This is the largest subgenus of *Lonchopria*. There is a flat or depressed, closely punctate upper median clypeal area at least in females, surrounded laterally and below by large, convex, shining and often impunctate areas. This feature is shared with certain other subgenera, but the ordinary bilobed glossa, distinct tooth of the mandibular pollex (= upper preapical mandibular tooth), dense tibial scopal hairs, and

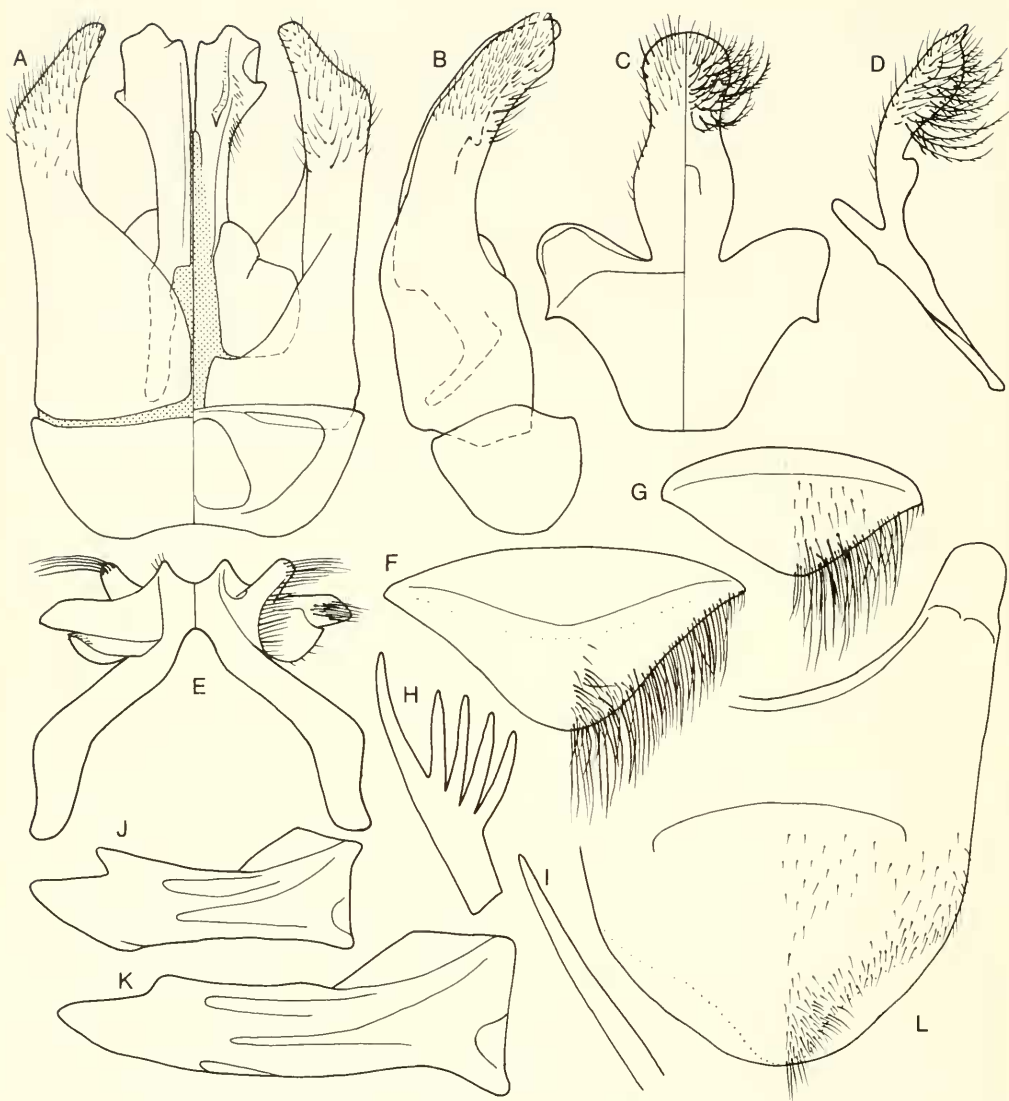


FIG. 24. *Lonchopria* (*Lonchoprella*) *annectens* n. sp. a-e. Genitalia, S8 and S7 of male. f, g. Labrum of female and male. h, i. Inner and outer hind tibial spurs of female. j, k. Mandibles of male and female. l. S6 of male (sides curved strongly away; sternum would be much broader if flattened).

strong, downcurved, hairy and often ornate process of T8 of the male distinguish *Biglossa*. (Figs. 25, 26, 27, 28, 31f, g)

Description: a. Metasoma slightly blue or green metallic to black, with or without pale hair bands, sometimes (*L. robertsi*, female) uniformly covered with pale hair or (*L. nivosa*, female) with broad mid-dorsal areas of pale hair. Length 8-14 mm. b. Clypeus with broad, convex, usually hairless, impunctate and shining sublateral areas, usually connected across lower clypeal region and thus forming a U surrounding flat or depressed, central, more densely punctate area; shining convex-

ities occasionally with a few punctures or in *L. chalybaea*, *inca*, *longicornis*, and *nivosa* with numerous punctures and hairs (dense in male). (In *L. inca* male, depressed central area scarcely recognizable.) c. Vertex little developed behind ocelli (swollen behind ocelli in *L. inca* and extending posteriorly in *L. nivosa*); anterior margin of median ocellus much farther from antennal bases than from posterior edge of vertex except in *L. nivosa*, *L. thoracica* female, and one unidentified female from Argentina, perhaps of this subgenus; in these forms the anterior margin of the median ocellus is about equidistant between antennal

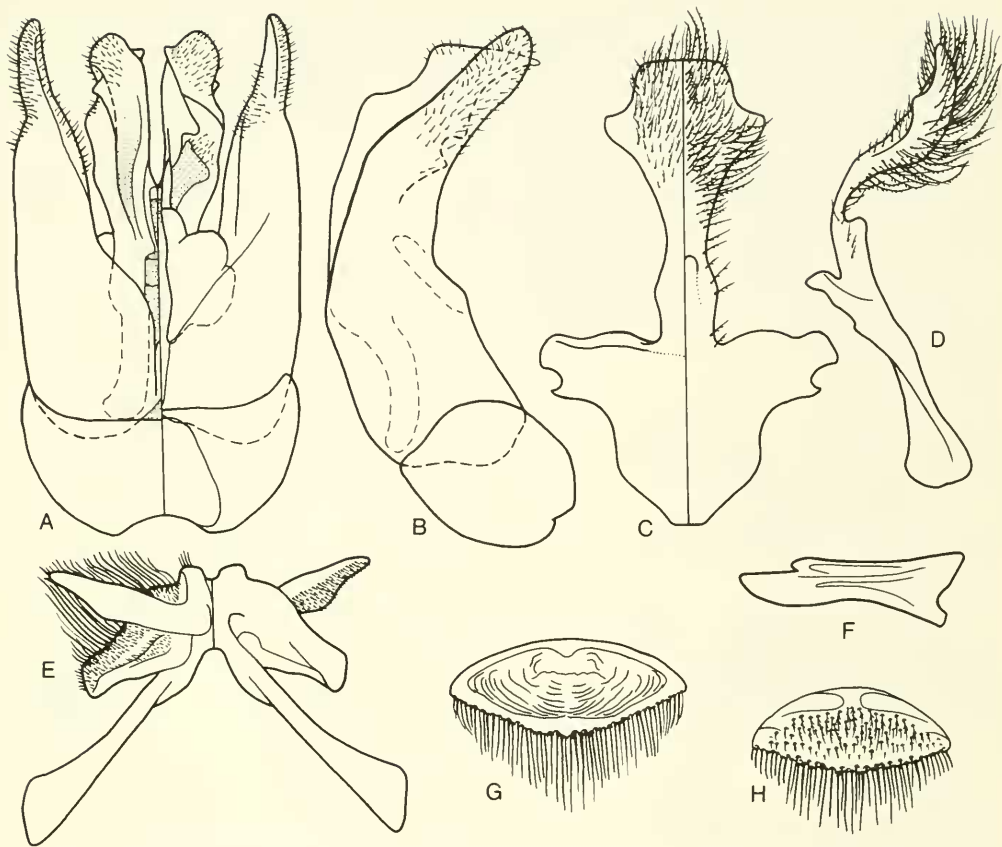


FIG. 25. *Lonchopria (Biglossa) chalybaea* (Friese). a-e. Genitalia, S7 and S6 of male. f. Mandible of male. g, h. Labrum of female and male.

bases and posterior edge of vertex. d. Mandible of female not expanded ventrad preapically, lower mandibular margin therefore uniformly curved, except in *L. robertsi* which is expanded (Fig. 28f). Mandible of male with preapical tooth (two such teeth in *L. thoracica* and an approach to two in *L. longicornis*) on upper margin (apex of pollex) strong, separated by narrow notch from rutellum or sometimes (as in *L. robertsi*) oblique with no notch; in *L. nivosa* with broad emargination instead of narrow notch; lower margin preapically usually expanded ventrad forming preapical convexity (not in *L. nivosa*, *L. thoracica*, and some others). e. Labrum of female more than twice as wide as long (less in *L. robertsi*; in *L. thoracica* length about 0.75 width), apex straight or rounded, sometimes emarginate, convex basal area strongly elevated, sometimes binodulose, occupying half to most of length of labrum, in latter case apical depressed zone only narrow margin; of male about twice as wide as long (or as wide as long in *L. thoracica*), tapering to narrowly rounded or emarginate apex, convex basal area shining or roughened, sometimes binodulose, sometimes

(e.g., *L. chalybaea*) merely a strong ridge across base of labrum but usually occupying more than half of labral length. f. Middle flagellar segments of male 1.5 to more than 2.0 times as long as broad. g. Basitibial plate of female rounded at apex, with hairs, strong marginal carina sometimes exposed; of male represented by apex and posterior carina only, increasing in height toward apex, anterior margin not or scarcely recognizable, or in some species (e.g., *L. nivosa*, *L. robertsi*) anterior carina present. h. Wings hairy throughout or basally largely hairless (*L. robertsi*). Second submarginal cell usually longer than third on posterior margin, receiving first recurrent vein near middle; shorter than or equal to third in *L. thoracica*, *L. nivosa*, and various others. i. Jugal lobe half to three fifths as long as vannal lobe, usually not reaching level of cu-v. (In *L. robertsi* nearly two thirds as long as vannal lobe and reaching level of cu-v; in *L. nivosa* four fifths as long as vannal lobe and exceeding level of cu-v.) j. T7 of male without pygidial plate, sometimes with longitudinal median bare zone, sometimes with large but undefined bare area; apex of T7 rounded (in

L. robertsi with two small, sharp apical horns). k. S7 of male with paired apicolateral hairy lobes, one pair broad, the other rather slender, or both rather slender. l. S8 of male with usually down-curved apical process, shorter to longer than body of sternum, broadened and hairy distally, without or usually with small to large lateral or latero-apical projection from enlarged apex; basal margin rounded or obtusely angulate without noticeable projecting spiculum; margin lateral to base of apical process rounded, shoulder-like. m. Apex of gonoforceps directed apicad, vertically flattened, rather membranous beneath and simple in shape except with ventral angular projection basal to membranous ventral surface in *L. thoracica*.

Distribution: Western Argentina (Mendoza to Jujuy) and north in the Andean uplift through Bolivia and Peru to Colombia. Some species occur in xeric lowlands while others occur at least as high as 3874 m in the Peruvian Andes.

Included species: *Lonchopria (Biglossa) aenea*

(Friese, 1906); *alopex* Cockerell, 1917; *chalybaea* (Friese, 1906) = *armata* (Friese, 1906); *deceptrix* (Moure, 1949), new combination [*Biglossidia*]; *inca* Cockerell, 1914; *longicornis* Michener, n. sp.; *nivosa* (Vachal, 1909); *robertsi* Michener, n. sp.; and *thoracica* (Friese, 1906). There are also numerous undescribed species.

Comments: Most of the species could be placed in a subgenus *Biglossidia* Moure but if this were done, then *Biglossa* s. str. would stand as a monotypic subgenus for *L. thoracica*, derived from *Biglossidia* and differing from it in a few striking apomorphies, as follows: Mandible of male with two preapical teeth, thus tridentate; male mandibular rutellum long, almost parallel-sided; labrum more elongate than usual, about as long as wide in male, 0.75 as long as wide in female, apex emarginate in both sexes; claws of female almost simple, inner ramus represented by minute tooth. The male mandibular character is not as distinctive as it seems. A specimen from Mendoza shows the tridentate condition clearly (Fig. 26f).

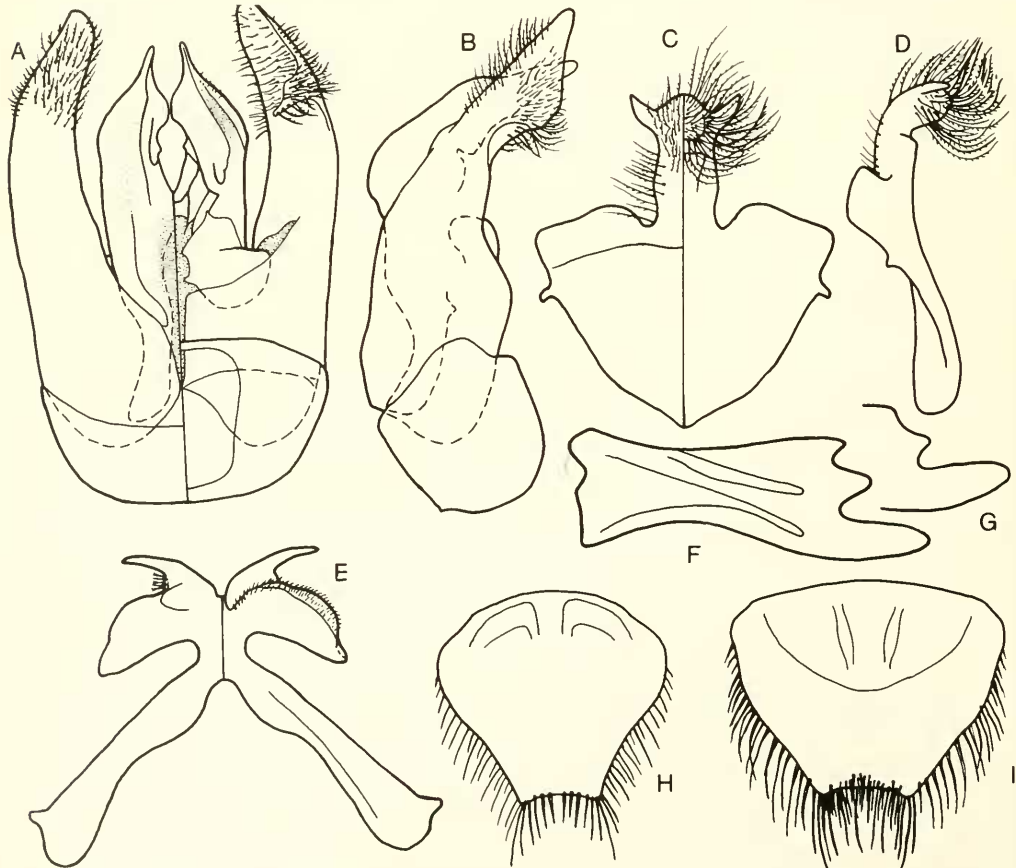


FIG. 26. *Lonchopria (Biglossa) thoracica* (Friese). a-e. Genitalia, S8 and S7 of male. f, g. Mandible of male from Mendoza and apex from Tucumán. h, i. Labrum of male and female.

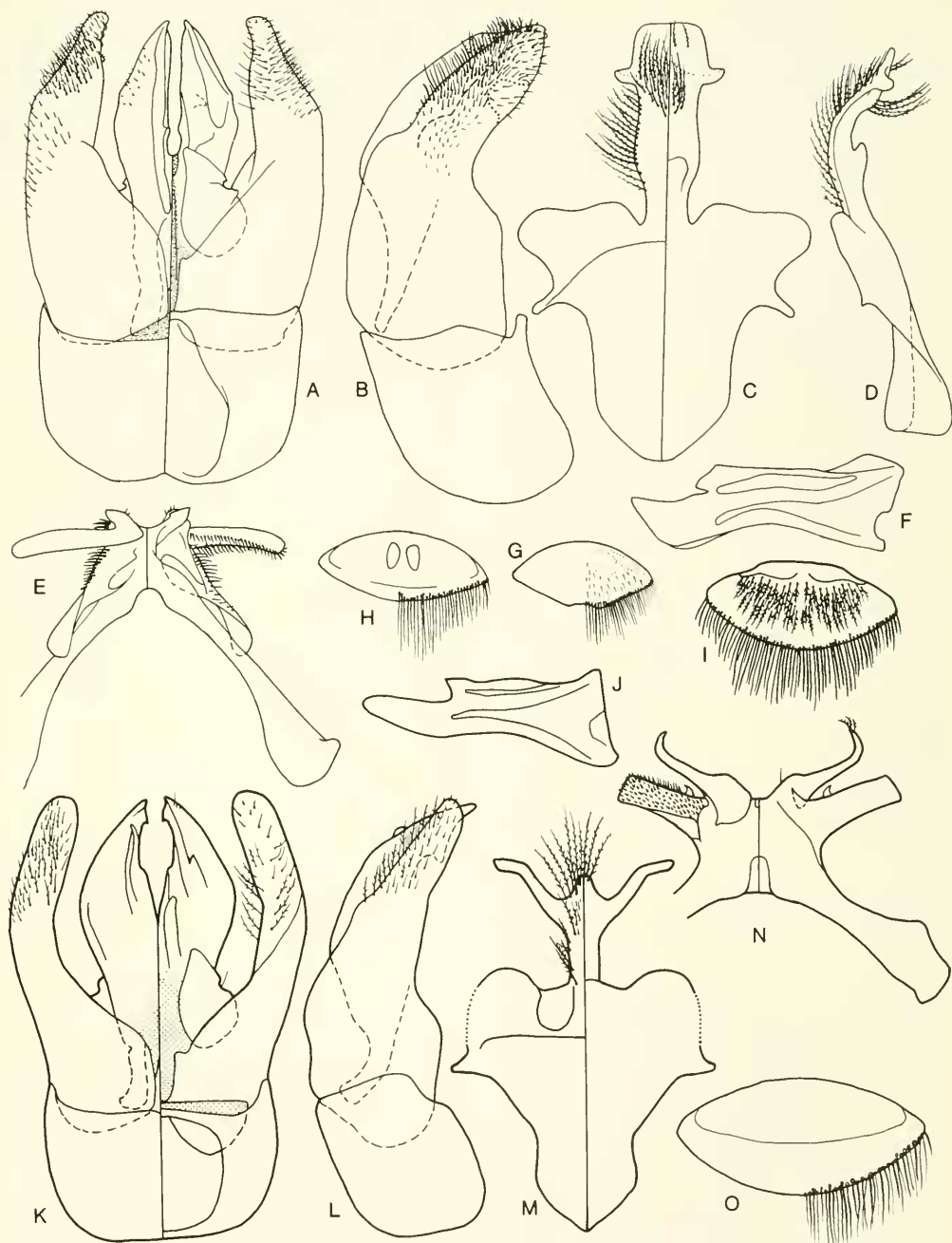


FIG. 27. **a-h.** *Lonchopria (Biglossa) longicornis* n. sp. **a-e.** Genitalia, S8 and S7 of male. **f.** Mandible of male. **g, h.** Labrum of male and female. **i-o.** *L. (B.) nivosus* (Vachal). **i.** Labrum of male. **j.** Mandible of male. **k-n.** Genitalia, S8 and S7 of male. **o.** Labrum of female.

Three specimens from Tucumán Province are similar to the Mendoza individual and have similar terminalia but have the two preapical mandibular teeth less well developed (Fig. 26g). The male of *L. longicornis* has a nearly straight margin (Fig. 27f) where the two teeth are in *L. thoracica*. Thus intergradations exist between the bidentate and tridentate condition. The terminalia of *L. thoracica* fall well within the range of variation among species placed in *Biglossidia*. It does not seem that *L. thoracica* is different enough from other species to justify putting it in a separate subgenus and thus making *Biglossidia* one more paraphyletic unit.

Another distinctive species, *L. nivosa* Vachal, has received the generic name *Aeganopria* Moure. Its most diagnostic features are: clypeal margin of female with four strong, equidistant teeth hidden among hairs; mandible of male with strong preapical tooth (apex of pollex) widely separated from long, almost parallel-sided rutellum; jugal lobe longer than in other species, about four-fifths as long as vannal lobe and exceeding level of cu-v; T7 of male broadly subtruncate at apex and bearing strong apical fringe, hairs longest sublaterally; S8 of male (Fig. 27m) not downcurved, sparsely hairy, with long apicolateral process on each side; ventral projection on apical process of S8 absent. The long jugal lobe and the straight and sparsely haired S8 may be plesiomorphic relative to other groups of *Biglossa*. In this case *Aeganopria* would be the sister group to the other *Biglossa* species and could well be recognized as a subgenus. The other characters of *Aeganopria*, however, are probable apomorphies relative to other groups of *Lonchopria* and the polarization of the wing and S8 characters is uncertain. *L. nivosa* falls within the general range of variability for *Biglossa* and a subgeneric name for it does not seem justified, although it is easily recognized by the generally dark pubescence, coarse punctation of the head, thorax, and T1, and in the female, broad dorsal areas of pale pubescence on T3, T4, and the apex of T2, the pale-haired areas not reaching the sides of the terga.

The species included in *Biglossidia* by Moure (*chalybaea*, *aenea*, and *deceptrix*, for a key to species see Moure, 1949) all have metallic blue reflections from the metasomal terga. The male of *B. chalybaea*, the type species of *Biglossidia*, differs from the other described and undescribed species in (1) the broadly punctate clypeus, densely covered with nearly erect hair except for a protruding, shining boss at each end of the clypeal truncation; (2) the strongly elevated, protruding clypeal margin proper below the above mentioned boss; (3) the short elevated basal area of the labrum, merely a

shining binodulose ridge across the base of the labrum; (4) the rather dense, short, pale hair occupying a labral zone beyond the elevated basal ridge; (5) the zone of hair over half as long as the flagellar diameter along the under side of the flagellum from base to apex; and (6) the large, right-angular, preapical tooth on the under side of the hind tibia; and (7) the swollen hind femur (illustrated by Moure, 1949, pl. xi). The female of the same species is unusual in having punctures on the elevated and shining parts of the clypeus. Thus *L. chalybaea* is about as distinctive as are *L. nivosa* and *thoracica*. In *L. chalybaea* and some others including *L. deceptrix*, S6 of the male is produced medially as a hairy, rounded process. In *L. aenea*, however, S6 is broadly rounded apically.

No character other than the blue metasoma appears to differentiate *Biglossidia* in Moure's original sense from diverse other species such as *L. longicornis*. Identifications by Moure of undescribed species in the collection of J. L. Neff show that Moure also included nonmetallic species also in *Biglossidia*. The blue species are rather large and robust (length 9-13 mm) while the nonmetallic species include similarly large forms like *L. inca*, intermediate sized forms like *L. longicornis*, and smaller forms like *L. robertsi*. Some, particularly *L. inca*, have apical pale hair bands so that they resemble superficially the subgenera *Lonchopria* s. str. and *Porterapis*. Others have basal pale hair bands as well (weakly developed in female *L. longicornis*, better developed in an unnamed species whose male is not yet recognized). In females of *L. robertsi* the terga are uniformly covered with pale appressed hair.

In most species the glossal lobes are about as long as broad or slightly more, but in a few such as *L. robertsi* they are over twice as long as broad.

Porterapis new subgenus

Type species: *Lonchopria porteri* Ruiz, 1936.

In size, body form, and pale hair bands on the metasomal terga, this subgenus resembles *Lonchopria* s. str. Morphologically, however, it resembles *Biglossa* from which it differs in the long glossal lobes (suggestive of *Leiproctus* subgenera *Glossopasiphae* and *Tetraglossula*) and scoop-shaped mandibles. (Fig. 29)

Description: a. Nonmetallic with narrow apical bands of pale hair on metasomal terga. b. *Clypeus* flat, not protuberant; lateral areas shining, nearly impunctate, connected by broad, similarly smooth zone across lower end of clypeus (in male lower half of clypeus, in female somewhat less); upper central densely punctate region not depressed in male, only slightly so in female. c. Vertex somewhat developed behind ocelli but

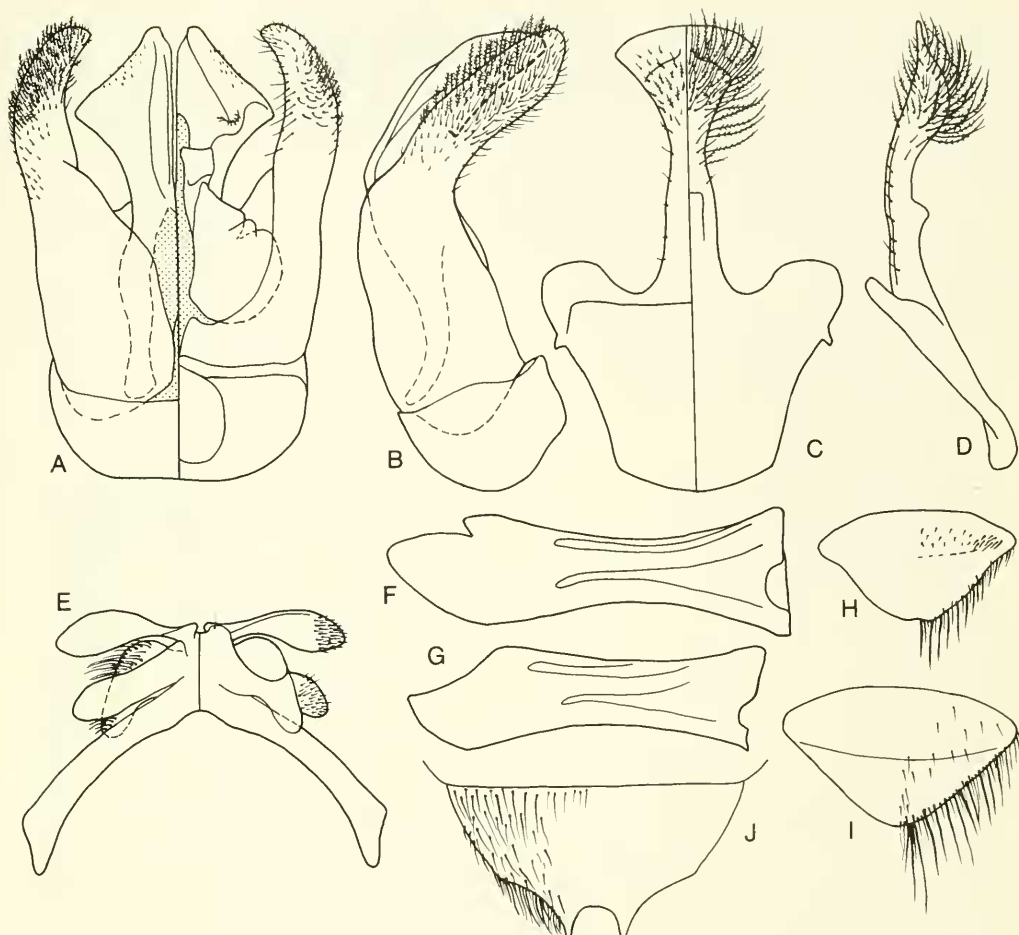


FIG. 28. *Lonchopria (Biglossa) robertsi* n. sp. a-e. Genitalia, S8 and S7 of male. f, g. Mandibles of female and male. h, i. Labrum of male and female. j. T7 of male.

anterior margin of median ocellus nearer to posterior margin of vertex than to antennal bases. d. Mandible especially of male expanded ventrad preapically; apex broad and scoop-shaped, preapical tooth of upper margin (Fig. 29i, j) reduced in female, absent in male. Glossal lobe (sense of Michener and Brooks, 1984) produced as slender hairy appendage longer than prementum and directed distad; thus glossa deeply bifid (Fig. 29h). e. Labrum less than twice as broad as long, apex truncate in female, emarginate in male; narrow strip across base scarcely elevated. f. Middle flagellar segments of male nearly twice as long as broad. g. Basitibial plate of female narrowly rounded at apex, completely covered with hair, posterior marginal carina visible from some positions; of male pointed, carina on anterior side present only near apex. Claws of female strongly curved, inner ramus reduced to small subbasal tooth. h. Wings with basal parts except near costal

margin of forewing hairless or nearly so. Second submarginal cell longer than third on posterior margin, receiving first recurrent vein at middle. i. Jugal lobe about three fifths as long as vannal lobe, nearly attaining level of cu-v. j. T7 of male with vaguely indicated bare pygidial area at apex; apex of T7 obtusely pointed. S6 of male produced apically as a hairy, rounded projection suggesting that of *L. (Biglossa) chalybaea*. k. S7 of male with three pairs of apicolateral hairy lobes, all rather slender. l. S8 of male with downcurved apical process longer than body of sternum, abruptly broadened and hairy at apex; basal margin broadly truncate; margin lateral to base of apical process very strongly convex, posteriorly produced.

Distribution: Central Chile (Coquimbo region).

Included species: *Lonchopria (Porterapis) porteri* Ruiz, 1936.

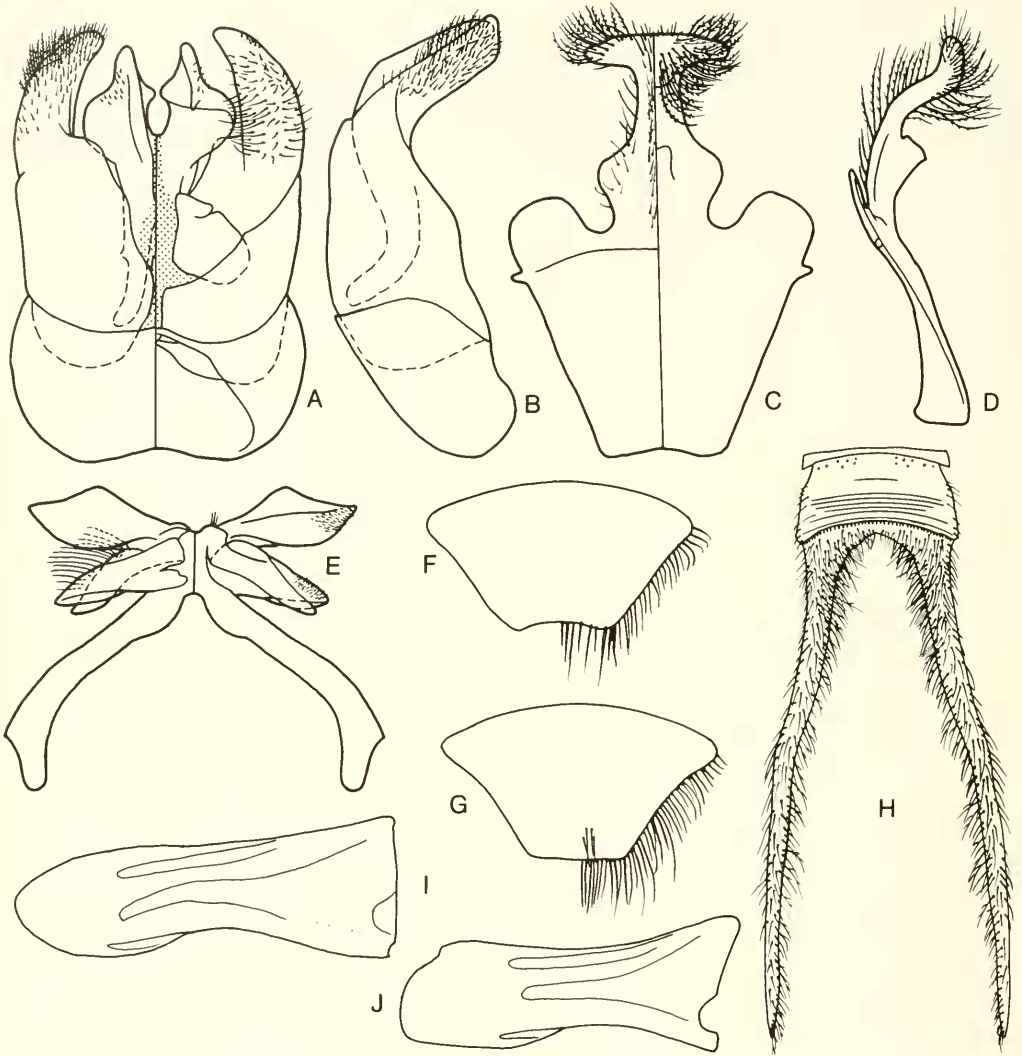


FIG. 29. *Lonchopria (Porterapis) porteri* Ruiz. a-e. Genitalia, S8 and S7 of male. f, g. Labrum of male and female. h. Glossa (male). i, j. Mandibles of male and female.

Comments: This subgenus is perhaps a derivative of *Biglossa*, which would therefore be paraphyletic. It is so distinctive, however, that it seems worth recognizing, especially since *Biglossa* has an apomorphy (the preapical angle on the lower mandibular margin of males, absent in some probably derived species) suggesting that it and *Porterapis* are sister groups.

Etymology: The subgeneric name was first used at the genus level by Padre J. S. Moure at least a third of a century ago, but was not published. It is a partial patronymic for Carlos Porter, Chilean naturalist, in recognition of his work on Chilean insects, plus *apis*, Latin for bee.

Subgenus *Lonchopria* Vachal s. str.

Lonchopria Vachal, 1905:204. Type species: *Lonchopria herbsti* Vachal, 1905 (= *Colletes zonalis* Reed, 1892 (monobasic).

Leioproctus (Lonchopria); Michener, 1965:41; Toro, 1973a:146.

This subgenus includes rather large, robust species, with abundant pale hair usually forming apical bands on the metasomal terga. The most distinctive features are the lack of the preapical (pollex) tooth on the upper margin of the male mandible and the rather short, tapering apical process of T8 of the male. (Figs. 30h, 31h; Figs. 83-109, Toro, 1973a)

Description: a. Nonmetallic, metasomal hair bands present or absent; basal bands absent. Length 8.5 (for small males) to 15 mm. b. *Clypeus of female punctate throughout, upper median area usually not appreciably depressed, lateral and distal areas with punctures and hairs only somewhat sparser than in central area*; male with distal part broadly shining, impunctate, hairless or nearly so, not strongly convex. c. Vertex little developed behind ocelli, anterior margin of median ocellus farther from antennal bases than from posterior margin of vertex (lateral view). d. Mandible of female with cap of rutellum usually expanded ventrad so that lower margin of mandible is not a uniform curve. *Mandible of male without the usual preapical pollex tooth but with large tooth along lower margin* (see figures in Toro, 1973a). e. *Labrum (both sexes) over two to four times as wide as long, apex straight (transverse) or rounded; convex basal area impunctate, occupying most of surface so that depressed apical part is only narrow margin* (figures in Toro, 1973a). f. Middle flagellar segments of male about 1.5 times as long as wide. g. Basitibial plate pointed, in female well defined, with hairs but not hidden; in male usually incomplete on anterior margin. h. Wings hairy throughout. Second submarginal cell shorter than third, receiving first recurrent vein near base to near middle. i. Jugal lobe about three fifths as long as vannal lobe, not reaching level of cu-v. j. T7 of male with elevated bare pygidial region (not distinctly margined), narrowed toward apex; apex of T7 truncate or slightly emarginate. k. S7 of male with paired apicolateral lobes small, slender (as in *L. similis*) or lower one rounded (*L. zonalis*), sparsely hairy to hairless (figures of this and characters l and m in Toro, 1973a). l. *S8 of male with apical process tapering, acutely pointed, not appreciably downcurved, hairy; basal margin convex without pointed spiculum; margin lateral to base of apical process concave, farther laterally shoulderlike*. m. Gonobase unusually short (Toro, 1973a); apex of gonoforceps relatively slender, directed mesad, perhaps representing gonostylus differentiated from gonocoxite (Toro, 1973a; lateral view Fig. 30h).

Distribution: Central Chile. One specimen [AMNH] from Catamarca Province, Argentina.

Included species: *Lonchopria (Lonchopria) similis* (Friese, 1906) [*Biglossa*]; *rufithorax* Ruiz, 1944; and *zonalis* (Reed, 1892) [*Colletes*]. The first and last are common. Another possibly included species is *L. luteipes* (Friese, 1916), the type of which has not been found; see Toro (1973a). This Chilean subgenus has been reviewed, and the species excellently illustrated, by Toro (1973a).

Comments: *Lonchopria* s. str. is quite different from other subgenera, and might have been regarded as a genus separate from *Biglossa* and *Porterapis* except for the intermediacy of *Ctenosibyne*. That subgenus has sparsely punctate areas on each side of the median depressed area of the

clypeus in females, suggestive of the usually impunctate areas of *Biglossa* and *Porterapis*. The male mandible has a tooth or process on the lower margin in both *Lonchopria* s. str. and *Ctenosibyne*. The volsellae appear acutely pointed apically as seen from above or beneath in both subgenera, because the apices are compressed. Unique derived features of *Lonchopria* s. str. include the short, pointed apical process of S8 of the male which is not appreciably downcurved; the rather small, paired apical lobes of S7 (Toro, 1973a); the short gonobase; and the large penis valve with two downward directed prongs (Fig. 30h). *Ctenosibyne* is intermediate between *Biglossa* and *Lonchopria* s. str. in gonobase, gonoforceps, and penis valve characters but more like *Biglossa* in S8.

Subgenus *Ctenosibyne* Moure

Lonchopria (Ctenosibyne) Moure, 1956, *Dusenina* 6:311.

Type species: *Lonchopria (Ctenosibyne) cingulata* Moure, 1956 (original designation and monobasic).

Leioproctus (Ctenosibyne); Michener, 1965:41.

This subgenus contains a large robust species similar to those of *Lonchopria* s. str. The tooth on the lower margin of the male mandible is a unique synapomorphy uniting *Lonchopria* s. str. and *Ctenosibyne*. The characters italicized below are the principal distinctive features of the subgenus. (Figs. 30a-g, 31d; Figs. 4-6, Moure, 1956)

Description: Similar to *Lonchopria* s. str. except as follows: a. T2-4 with broad basal pale hair bands as well as apical ones. b. Female with clypeus punctate throughout, upper median part distinctly depressed and more closely punctate than shiny and sparsely punctate areas lateral to it; *male with clypeus uniformly punctate and hairy, slightly depressed medially*. d. *Mandible of female unusually slender, cap of rutellum not at all expanded, lower margin of mandible a uniform curve; preapical dorsal tooth (of pollex) scarcely developed* (Fig. 30g). Mandible of male with preapical dorsal tooth (of pollex) enormous, separated from rutellum by broad concavity; cap of rutellum expanded ventrad; lower margin with large triangular tooth before middle (Fig. 30e). e. *Labrum (both sexes) with length about half of width, tapering to narrow truncate or feebly emarginate apex; convex basal area of female elevated to strong transverse ridge medially, dull, median length equal to that of depressed apical area; in male convex basal area shining, with a few short hairs apically, length much less than that of depressed apical area*. g. Basitibial plate of female long but rounded apically; of male with anterior margin carinate like posterior margin. j. T7 of male with broad bare area but not elevated as a pygidial area; apex of T7 rounded. k. S7 of male with paired apicolateral lobes rather slender but hairy (Fig. 4, Moure, 1956). l. *S8 of male with apical*

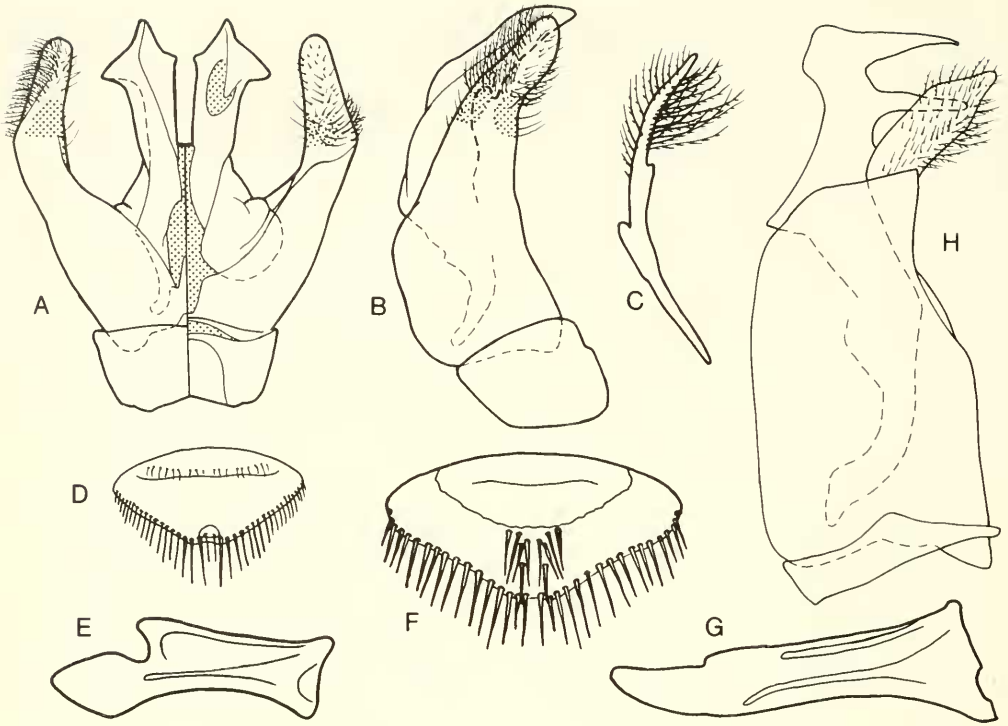


FIG. 30. a-g. *Lonchopria (Ctenosibyne) cingulata* Moure. a, b. Genitalia of male. c. S8, side view, male. d, e. Labrum and mandible of male. f, g. Labrum and mandible of female. h. *L. (Lonchopria) similis* (Friese), genitalia of male, side view.

process large, downcurved, apically abruptly broadened and truncate; basal margin rounded without projecting spiculum; margin lateral to base of apical process arcuate posteriorly, shoulderlike (Fig. 5, Moure, 1956). m. Gonoforceps without separate distal (possibly gonostylus) region (Fig. 6, Moure, 1956, and Fig. 30a, b); penis valves less modified than in *Lonchopria* s. str.

Distribution: Southern Brazilian plateau (Paraná).

Included species: *Lonchopria (Ctenosibyne) cingulata* Moure, 1956.

Figure 30a is a new drawing of the genitalia; Moure's (1956) illustration seems to have been based on an abnormal individual (a paratype [Lawrence]). Moure's figure of S7 has the dorsal view on the right, not the left as in the other figures.

TRIBE COLLETINI

The tribal characteristics listed in the key above are all apomorphic relative to the Paracolletini and other similar bees such as *Andrena*. The relationships of this tribe to the Paracolletini are considered in the discussion of that tribe. There are two genera, separable as follows:

KEY TO THE GENERA OF COLLETINI

1. T1 with anterior surface not

broadly concave, often with a longitudinal median concavity; dorsal surface of T1 about as long as exposed part of T2 and at least two thirds as long as anterior surface of T1 seen in profile; second recurrent vein usually sigmoid with posterior half arcuate distad (Fig. 1b), rarely angulate distad at alar fenestra on flexion line; base of propodeum with short subhorizontal to vertical basal

zone usually defined posteriorly by a carina or sharp change in slope or sculpture and divided by longitudinal carinae which may delimit strong pits *Colletes*

- T1 with anterior surface broadly concave; dorsal surface of T1 much shorter than exposed part of T2 and less than two thirds as long as anterior surface of T1 seen in profile; second recurrent vein with posterior half straight or gently arcuate, anterior part not curved in the reverse direction, thus vein not sigmoid (Fig. 31i); base of propodeum with sloping basal zone nearly smooth, not traversed by longitudinal carinae *Mourecotelles*

Genus *Mourecotelles* Toro and Cabezas

This genus, found only in temperate South America, appears to be the sister group to *Colletes*. Its apomorphies relative to *Colletes* include the shape of T1 (perhaps two independent characters) and the short, almost globose metasoma with T6 of the female scarcely exerted. The apomorphies of *Colletes* include all the characters listed in the key to genera except those of T1. The appropriate outgroup is the Paracolletini, and *Mourecotelles* has more characters like those of Paracolletini than does *Colletes*. (Fig. 31i; Figs. 1-40, 94-96, Toro and Cabezas, 1977; Figs. 41-97, Toro and Cabezas, 1978).

I here unite three genera described by Toro and Cabezas (1977, 1978) under a single generic name since they are similar to one another and I think the relationships relative to *Colletes* are better indicated in that way. Of the two names available for this genus, *Hemicotelles* and *Mourecotelles*, I use the latter because it is the larger and much commoner group (8 included species compared to 2 in *Hemicotelles*), even though the former has page priority.

There are three subgenera of *Mourecotelles*. *Hemicotelles* and *Xanthocotelles* have simple claws in the female, an apomorphic character relative to Colletinae in general. The same two subgenera have what Toro and Cabezas regard as a rudimentary pygidial plate, absent in *Mourecotelles* s. str. I have not seen the female of *Hemicotelles* but in *Xanthocotelles* there is only a small, bare, elevated area at the apex of T6. It may well be an apomorphic feature rather than a remnant of a pygidial plate, for it is narrowed to a point anteriorly, instead of broadened anteriorly like a

pygidial plate. Even *Mourecotelles* s. str. has the same region broadly elevated, quite unlike *Colletes*, although not clearly defined or bare as in *Xanthocotelles*. Thus it seems likely that *Mourecotelles* s. str. is the sister group to the other two subgenera taken together. Apomorphies of *Mourecotelles* s. str. include the convex apical half of the lower margin of the male mandible (see Toro and Cabezas, 1977).

KEY TO THE SUBGENERA OF *MOURECOTELLES*

1. Basal zone of propodeum margined posteriorly by weak carina; middle flagellar segments of male about twice as long as wide. (Claws of female simple.) *Hemicotelles*
- Basal zone of propodeum not margined posteriorly by carina; middle flagellar segments of male less than twice as long as wide. 2
2. Claws of female simple; tibiae and tarsi reddish yellow *Xanthocotelles*
- Claws of female cleft; tibiae and tarsi largely blackish *Mourecotelles* s. str.

Subgenus *Mourecotelles* Toro and Cabezas s. str.

Mourecotelles Toro and Cabezas, 1977:50. Type species: *Mourecotelles mixta* Toro and Cabezas, 1977, by original designation.

This subgenus, the only one with cleft claws in the female and also the only one with the pygidial plate completely absent, was revised and illustrated by Toro and Cabezas (1977). The eight described species are found in Chile, Argentina, and Bolivia.

Subgenus *Hemicotelles* Toro and Cabezas

Hemicotelles Toro and Cabezas, 1977:46. Type species: *Lonchopria ruizii* Herbst, 1923, by original designation.

This subgenus was revised and illustrated by Toro and Cabezas (1977). The two species range from central Chile to Santa Cruz Province in Argentina. The type species was erroneously included in *Lonchopria* by Michener (1965).

Subgenus *Xanthocotelles* Toro and Cabezas

Xanthocotelles Toro and Cabezas, 1978:131. Type species: *Xanthocotelles adesmiae* Toro and Cabezas, 1978, by original designation.

This subgenus was revised and illustrated by Toro and Cabezas (1978). The eleven known species are found in central Chile south to Aisén

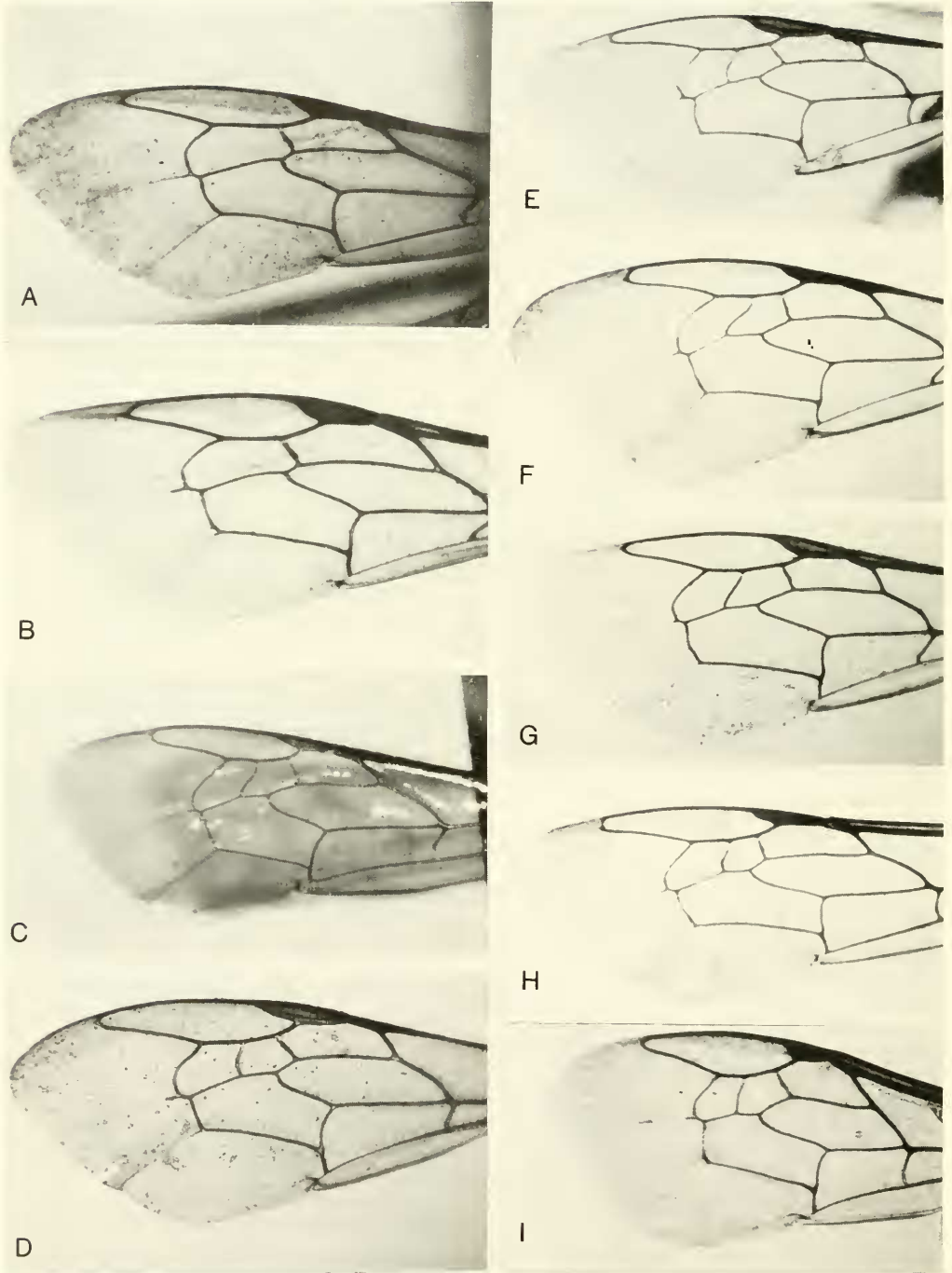


FIG. 31. Forewings. a. *Brachyglossula rufocerulea* (Frieze). b. *Niltonia virgilii* Moure. c. *Lonchorhyncha ecuadoria* (Frieze). d. *Lonchopria* (*Ctenosibyne*) *cingulata* Moure. e. *Lonchopria* (*Lonchoprella*) *annectens* n. sp. f. *Lonchopria* (*Biglossa*) *thoracica* (Frieze). g. *L. (B.) robertsi* n. sp. h. *L. (Lonchopria) zonalis* (Reed). i. *Mourecotelles* (*Mourecotelles*) *mixta* Toro and Cabezas.

Province and xeric parts of Argentina (provinces of Catamarca and Mendoza).

Genus *Colletes* Latreille

- Colletes* Latreille, 1802:423. Type species: *Apis succincta* Linnaeus, 1758 (monobasic).
Evodia Panzer, 1806:207. Type species: *Apis calendarum* Panzer, 1802 = *Apis succincta* Linnaeus, 1758 (monobasic).
Monia Westwood, 1875:221 (not Gray, 1850), new synonym. Type species: *Monia grisea* Westwood, 1875 (monobasic).
Monidia Cockerell, 1905b:9, new synonym. Type species: *Monia grisea* Westwood, 1875 (autobasic). New name for *Monia* Westwood.
Rhinocolletes Cockerell, 1910:242. Type species: *Colletes nasutus* Smith, 1853.
Ptilopoda Friese, 1921:83. Type species: *Colletes (Ptilopoda) maculipennis* Friese, 1921 = *Colletes spiloptera* Cockerell, 1917 (monobasic).
Denticolletes Noskiewicz, 1936:486. Type species: *Colletes graeffei* Alfken, 1900 (monobasic).
Puncticolletes Noskiewicz, 1936:490. Type species: none designated. Therefore name not valid under International Rules of Zoological Nomenclature article 13b. Warncke (1978) considers *Puncticolletes* a synonym of *Rhinocolletes*.
Rhynchocolletes Moure, 1943:447, new synonym. Type species: *Rhynchocolletes albicinctus* Moure, 1943, by original designation.
Pachycolletes Stoeckert, 1954:73. Type species: *Apis cunicularia* Linnaeus, 1761, by original designation. (Stoeckert cites Bischoff as responsible for this name, as does Warncke, 1978. However, the description appears to be the work of Stoeckert.)
Albocolletes Warncke, 1978:353. Type species: *Halictus albomaculatus* Lucas, 1849, by original designation.
Elecrolletes Warncke, 1978:330. Type species: *Colletes elegans* Noskiewicz, 1936, by original designation.
Nanocolletes Warncke, 1978:341. Type species: *Colletes nanus* Friese, 1898, by original designation.
Simcolletes Warncke, 1978:348. Type species: *Colletes similis* Schenck, 1853, by original designation.

This genus is found in all continents except Australia. The long synonymy above results from two tendencies: The first is the giving of names to each unusual species. Thus *Monidia* contains a Mexican species with the last antennal segment of the male expanded and with long hairs on the hind tibiae of the male. *Denticolletes* contains a Palearctic species with the axilla produced and angulate. *Rhinocolletes* (Palearctic) and *Rhynchocolletes* (Brazilian) each contains a species with the malar area unusually long and with the clypeus produced, the latter having the legs of the male modified. *Ptilopoda* contains two species (Texas to Panamá) with spotted wings and somewhat modified hind legs in the male. The second tendency is to give names to groups of the less exceptional species in limited geographical areas, in this case the western Palearctic. These names should simply be ignored until the genus is reviewed worldwide and appropriate subgroups recognized. (Fig. 1b; figures in Stephen, 1954; Noskiewicz, 1936; etc.)

Rhynchocolletes is also unusual in the short mandibles of the male (shorter than malar area), the broad, deep concavity between the ocelli and the summit of the eye, and the second recurrent vein which is only gently arcuate outward in the posterior portion and straight in the anterior portion, thus not S-shaped. It is known only in the male. The short mandible and the form of the second recurrent vein are suggestive of *Mourecolletes* but neither character is decisive because intergradation occurs among more ordinary species.

The *Colletes* species of America north of Mexico were revised by Stephen (1954); those of Latin America have never been reviewed. Particularly in temperate South America the fauna is diverse and beautiful; some species have metallic blue metasomas, some have bright red thoracic hair, and various species have long malar areas suggesting *Rhinocolletes* and attaining the extreme in *Rhynchocolletes*.

EXCLUDED TAXA

Stenocolletes Schrottky

- Stenocolletes* Schrottky, 1909:253; 1913:238. Type species: *Stenocolletes pictus* Schrottky (monobasic).

This generic name was included in the Colletidae by Schrottky and by subsequent authors, including Michener (1965). However, the reason for that placement is obscure, for Schrottky says that the tongue of his two specimens was hidden. *S. pictus* was based upon two male bees 7 mm long with three submarginal cells and with the following parts dull yellow: longitudinal streak on mandible, inner orbits, posterior margin of pronotum, teg-

ula, spots on the second, third, and sometimes fourth metasomal segments, tarsi, anterior tibia (almost wholly), and bases of other tibiae. No American colletid known to me has such integumental markings. The specimens appear to be lost but most probably were panurgine bees of the genus *Psaenythia* or possibly *Liphanthus*. Schrottky (1913) regarded it as the most distinctive of the hairy Colletidae, a fact suggesting that it was not a colletid.

Orphana Vachal

This genus was originally included in the Col-

letidae and on the basis of literature was placed as a subgenus of *Leioproctus* by Michener (1965). It is, however, an andrenid of the subfamily An-

dreninae, as shown by Rozen (1971) and Michener (1986c).

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These remarks would be incomplete without reference to the important works on South American Colletinae by Padre J. S. Moure, published from 1943 to 1964 and by Prof. Haroldo Toro, published from 1970 to 1977. Both authors published illustrations that moderated the number that had to be included in the present work. Padre Moure recognized (usually at the genus level) many of the taxa here described. His identifications left in various collections and his preliminary catalogue have proved invaluable to me.

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APPENDIX

The Appendix contains descriptions of the new species mentioned in the earlier parts of this paper, together with certain taxonomic adjustments at the species level.

Collections housing specimens are cited by city names in square brackets. The following is a list of the institutions concerned:

1. Austin - J. L. Neff collection, Central Texas Melittological Institute, Austin, Texas, U.S.A.
2. Berlin - Zoologisches Museum an der Humboldt-Universität, Berlin, D.D.R.
3. Buenos Aires - Museo Argentina de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Argentina.
4. Curitiba - Faculdade de Filosofia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
5. La Plata - Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, Argentina.
6. Lawrence - Snow Entomological Museum, University of Kansas, Lawrence, Kansas, U.S.A.
7. Logan - U.S.D.A. Bee Biology and Systematics Laboratory, Utah State University, Logan, Utah, U.S.A.
8. New Brunswick - Department of Entomology and Economic Zoology, Rutgers University, New Brunswick, New Jersey, U.S.A.
9. New York - American Museum of Natural History, New York, New York, U.S.A.
10. Washington - National Museum of Natural History, Washington, D.C., U.S.A.

***Leioproctus (Perditomorpha) arnauellus*
new name**

Perditomorpha arnaui Moure, 1954:168 [homonym of *Nomiocolletes arnaui* Moure (1949:441) in *Leioproctus*].

I pointed out the above homonymy long ago (Michener, 1965). It seems appropriate now to rename the junior homonym.

***Leioproctus (Perditomorpha) eulonchopriodes*
new species**

This species resembles *L. (P.) iheringi* in the extraordinarily coarse punctation, but differs in having yellow apical integumental bands on some of the metasomal terga. Not only do the presence of these bands and the coarse punctation suggest *Eulonchopria*, but also the elevated rims at the extreme margins of the terga and the darkened costal margin of the forewing are *Eulonchopria*-like, and different from other *Perditomorpha*. (Fig. 2a-f)

Description: Nonmetallic black except for yellowish integumental tergal bands and reddish coloration on legs. Metasomal terga completely without hair bands.

Male: Length about 7 mm; forewing length 6.5 mm. *Structure.* Eyes distinctly converging below except for upper extremities which converge above. Ocellocipital distance about 1.8 ocellar diameters; interocellar distance over two ocellar diameters, > ocellular distance; distance from anterior edge of median ocellus to posterior edge of vertex much less than that to antennal bases. Vertex behind ocelli raised, convex. Clypeus not protuberant; clypeoantennal distance about twice diameter of antennal socket; malar area linear. Labrum nearly five times as long as wide, apex broadly and gently concave, basal two fifths convex, smooth and shining, distal three fifths depressed, with scattered short hairs basal to fringe. Antennal scape not reaching anterior ocellus; flagellum short, wider than scape, segment 1 scarcely longer than broad, 2 and 3 about twice as wide as long, remaining segments wider than long except last which is about 1.3 times as long as wide. Propodeum in profile with base sloping and somewhat shorter than metanotum; triangular area unusually small, at base about one third as wide as propodeum, marginal line pitted but not conspicuously so because pits no larger than nearby punctures. Wings hairy throughout, basal vein of forewing scarcely distal to cu-v, second submarginal cell scarcely shorter than posterior margin of first, receiving first recurrent vein about one fifth of length of cell from base; jugal lobe of hind wing exceeding level of cu-v, about two thirds as long as vannal lobe measured from base. Basitibial plate with apex rounded, surface shining, with a few short hairs. Pygidial area only slightly paler and less densely hairy than adjacent areas. Hidden sterna and genitalia as in Fig. 5a-d and f. *Surface.* Punctation extremely coarse and rather dense, interspaces much less than a puncture width, smooth, shining; clypeus with transverse preapical impunctate line with upper margin irregular; supraclypeal area punctate, slightly more finely so than clypeus; genal area much more finely punctate than most of body; small area lateral to ocelli, lower part of hypocpimeral area, and propodeal triangle smooth, shining; most coarsely punctured areas are mesepisternum and discs of T1-3; posterior marginal zones of T1-3, and to a lesser extent succeeding terga, broadly depressed and more finely punctate than discs of terga, narrower posterior margins impunctate and on T1-3 strongly upturned; sterna rather sparsely and finely punctate, surface minutely roughened. *Color.* Black; distal half of mandible, tegula, trochanters and femora dark reddish brown; flagellar segments 3-11, tibiae and tarsi yellow-brown; T1, 3, and 4 with broad, apical, yellow bands occupying entire depressed marginal zones; T5 and 6 with similarly broad zones, brownish in the specimen, possibly yellowish in well preserved material; T1-6 with margins translucent; S1-5 with margins inconspicuously

brownish translucent. Wings grayish, costal margin from stigma to apex distinctly darkened. *Pubescence*. Mostly extremely short and sparse, light brown or on venter, whitish; longer, denser, pale brown, and plumose on face (largely obscuring surface across middle of face and on paraocular area, especially near antennal base), genal area, posterior margin of vertex, posterior lobe of pronotum and vicinity, venter of mesepisternum (white), side of scutellum, metanotum, and side of propodeum (especially above); legs also with somewhat longer hair. Sternal hair bands weak and inconspicuous except for long, dense, apical fringe on S5.

Holotype male: Argentina: Salta Prov., Pocitos, November, 1956 (M. Fritz) [Lawrence].

Comments: As in species of *Nomiocolletes*, ordinary relaxing of the specimen in a humid atmosphere for dissection of genitalia and mouthparts results in a change in the integumental bands from strongly colored to brownish translucent. They are no longer strongly colored in the holotype.

Etymology: The specific name is the stem of the generic name *Eulonchopria* plus *odes*, indicating resemblance.

Leioproctus (Perditomorpha) inconspicuus new species

This is a representative of the group of *L. arnaueus* and *bruneri* (*Perditomorpha* s. str.) as indicated by the leg and sternal scopae of the female and T7 of the male, but differs from those species and resembles most other *Perditomorpha* species in having a coarsely pectinate inner hind tibial spur of the female. It is markedly smaller than other species of *Perditomorpha* s. str. Its characters are summarized in the Comments under the subgenus *Perditomorpha*. (Fig. 3a-f)

Description: Nonmetallic black; pubescence largely pale, almost not forming tergal hair bands.

Male: Length 5.5-7 mm, forewing length 4.5-5 mm. *Structure*. Inner orbits converging below. Ocellocipital distance over 1.5 ocellar diameters; interocellar and ocellocular distances equal to about three ocellar diameters. Vertex behind ocelli convex, weakly elevated. Clypeus not protuberant; clypeoantennal distance more than diameter of antennal socket; malar area absent; genal area narrower than eye seen from side. Antenna almost reaching tegula; scape not quite reaching median ocellus; flagellar segments 2 and 3 about twice as wide as long, segments 1, 9, and 10 about as wide as long, middle segments broader than long, segment 11 about 1.75 times as long as wide. Second submarginal cell nearly as long as first, receiving first recurrent vein near base. Basitibial plate narrowly rounded at apex, surface with scattered short hairs arising from conspicuous bases. Hidden sterna and genitalia as in Fig. 3a-e. *Surface*. Head, thorax, and T1 (except posterior margin) smooth and shining

except for punctures. Face below antennae punctate throughout, punctures separated by less than half a puncture width; above antennae punctures sparser, area between and behind ocelli impunctate, ocellocular area with punctures widely separated; genal area with many small punctures. Thoracic punctures similar in style to those of clypeus, mostly separated by about a puncture width, discal areas of scutum and scutellum with punctures smaller and separated by nearly two diameters, hypopimeral area with punctation similar to adjacent areas or with only limited smooth regions. Propodeal triangle smooth, marginal lines deeply impressed but not or weakly pitted. Metasomal terga much more finely punctate than thorax, T1 with punctures separated by several puncture widths, T2-7 more closely punctate, T1-6 with depressed posterior marginal zones which are impunctate apically but with minute punctures near bases, surfaces of these zones minutely roughened, like rest of surfaces of T2-6. Sterna minutely roughened and with widely separated small punctures, except close on S6. *Color*. Black, following parts dark reddish brown: apical two thirds of mandible, under side of flagellum, tarsi, anterior surface of front tibia, sometimes other tibiae, depressed, translucent marginal zones of T1-6 and weakly on S1-4 or 5. Tegula dusky brown. Wings infuscated brownish, veins and stigma blackish brown. *Pubescence*. Dusky yellowish white, not forming metasomal bands although a little denser near apices of terga than elsewhere, especially laterally, very sparse on sterna except for apical fringe on S4, dense apical fringe on S5, and dense short hairs apically on S6.

Female: Length 5.5-7 mm, forewing length 4.5-5 mm. Agrees with description of male except as follows: *Structure*: Interocellar and ocellocular distances less than three ocellar diameters. Scape often reaching anterior ocellus; flagellum shorter than in male, segments 2-3 more than twice as wide as long, 4-5 about twice as wide as long, 9 sometimes as wide as long, 10 about 1.5 times as long as wide. Inner hind tibial spur with six to eight long teeth. *Surface*: Punctuation finer and sparser than in male, only clypeus nearly as strongly punctate as in male; supraclapeal area with lower central area with only scattered punctures, otherwise punctures mostly separated by several puncture widths except closer on lower part of frons, front and sides of scutum, sides and posterior part of scutellum. Punctures on T1-4 minute and widely separated. S2-5 with broad apical bands of coarse punctures or hair bases. *Color*. Tibiae and tarsi brownish black; basal parts of S2-5 brown. Base of pygidial plate red. *Pubescence*. Generally more yellowish than in male. Dorsal pubescence of thorax short, strongly plumose, ochraceous; some hairs dusky in some lights along outer surface of hind tibia beyond basitibial plate; scopal hairs of S2-4 yellowish.

Type material: Holotype male, allotype female, and six male and nine female paratypes: Argentina: Salta Prov., Tartagal, 502 m altitude, 16

Mar. 1984 (R. B. Roberts) [Lawrence; paratypes in New Brunswick, Curitiba, Buenos Aires]. Thirty male and one female paratypes: Salta Prov., Campo Durán, 51 km north-northeast of Tartagal, 500 m altitude, 16 March 1984 (R. B. Roberts) [Lawrence, New Brunswick, Curitiba, Buenos Aires].

Other material: Bolivia: Depto. Santa Cruz: 2 and 12 km west of Montero, 300 m altitude, 19 and 21 Feb. 1976; Santa Cruz de la Sierra, botanical garden, 400 m altitude, 17 Feb. 1976; 34 km south of Santa Cruz de la Sierra, 500 m altitude, 24 Feb. 1976; 15 km southwest of same, 400 m, 10 Mar. 1976; San Javier, 600 m altitude, 2 Mar. 1976 (all collected by R. B. Roberts) [New Brunswick, Lawrence].

Comments: Additional characters of this species are given in the Description and Comments under the subgenus *Perditomorpha*.

Etymology: The specific name is the Latin for inconspicuous, with reference to the small size, dull coloration, and "ordinary" appearance of this species, which is nonetheless important in showing the intergradation of *Perditomorpha* and the formerly recognized *Bicolletes*.

Leioproctus (Kylopasiphae) pruinus
new species

In appearance, including the pale appressed hair covering T2-4 of the female and more erect pale hair on the metasoma of the male, this species resembles *Lonchopria robertsi* and *Leioproctus (Pygopasiphae) mourellus*, species that occur in the same area. It differs, of course, in the striking generic and subgeneric characters. It is the only known species of its subgenus. (Figs 5a-f, 10f, 23e)

Description. Nonmetallic black; pubescence white.

Male: Length 7-8 mm, forewing length 5-5.5 mm. *Structure.* Inner orbits converging below. Ocellocapital distance about 1.5 ocellar diameters; interocellar distance about three ocellar diameters, greater than ocellocular distance. Vertex behind ocelli gently convex, not elevated. Clypeus scarcely protuberant, flat in profile; clypeoantennal distance more than diameter of antennal socket; malar area short, about one third as long as diameter of pedicel; genal area as wide as eye seen from side. Antenna reaching base of scutellum, scape not reaching anterior ocellus, first and second flagellar segments subequal in length, wider than long, third segment about 1.5 times as long as wide, remaining segments slightly over 1.5 times as long as wide. Second submarginal cell as long as first, receiving first recurrent vein one fourth of cell length from base. Basitibial plate with only four or five short hairs. Hidden sterna and genitalia as in Fig. 5a-e. *Surface.* Smooth and shining except for punctures. Clypeus smooth and shining except for areas of small, rather dense punctures at extreme sides and across upper margin; somewhat less dense punctures

extending down in longitudinal median zone from upper margin to below middle of clypeus; supraclypeal area with large triangular impunctate area extending to point at level of lower margins of antennal sockets; rest of lower half of face with fine, rather dense punctures, except sparse near eye margin; frons with strong punctures separated by about two diameters; ocellocular area impunctate, extending down near eye margin as sparsely punctate zone; gena and vertex behind ocelli with moderate sized dense punctures. Thorax coarsely punctate including side and posterior surface of propodeum; scutum with punctures mostly separated by two or more diameters, anterior median part and posterior part of disc nearly impunctate, anterolateral part closely punctate; scutellum similar but anterior part of disc impunctate; mesepisternum and side of propodeum with punctures mostly separated by less than a puncture width; lower part of hypocpimeral area and propodeal triangle impunctate. Metasomal terga with punctures about as large as those of vertex behind ocelli, separated by several puncture widths, posterior margins of T1-6 broadly impunctate. T7 with surface shiny, coarsely and irregularly roughened. Metasomal sterna with surfaces microreticulate, diffuse bands of fine punctures across posterior parts of S1-5, such punctures occupying much of exposed surface of S6. *Color.* Black, apical two fifths of mandible and pygidial part of T7 red; flagellum brownish black; tarsi and apex of front tibia yellow brown; tegula translucent pallid posteriorly; apical margins of T1-6 broadly translucent pale brown; sterna dark brown. *Wings* transparent, veins and stigma brown. *Pubescence.* White, long, erect, especially long and dense on genal and hypostomal areas; hairs arising near upper margin of clypeus directed apicad over impunctate region and ending below apex of clypeus; metasomal terga with short, appressed, white hair in addition to long and more or less erect hair; appressed hair forming basal bands that nearly hide surface on T3-5; T6 covered with such hair; S2-5 with apical fringes of long yellowish hair, similar on all four sterna.

Female: Length 8-8.5 mm; forewing length 5.2-5.5 mm. Agrees with description of male except as follows: *Structure.* Flagellum shorter, segments 1 and 4-9 about as long as wide, 2 much wider than long, 3 slightly so, 10 nearly twice as long as wide. Basitibial plate—see subgenus. *Surface.* Clypeus with no band of punctures across upper margin and only small area laterally; upper central part with scattered rather coarse punctures down to below middle of clypeus; lower half of face with punctate areas having coarser punctures than in male, resembling punctuation of frons; ocellocular area with numerous minute punctures. T2-4 with punctures much finer than those behind ocelli. *Color.* Basitarsi sometimes dusky. T1-5 with apical margins broadly translucent yellow-brown. *Pubescence.* A little more yellowish.

lowish than in male dorsally, prepygidial and pygidial fimbriae usually yellowish; sternal scopal hairs yellowish. Hairs of head shorter than in male, not at all covering clypeus from above; T2-4 with erect hairs rather short, appressed hairs uniformly dispersed and not forming basal (or apical) hair bands; pygidial and prepygidial fimbriae long and dense; sternal scopal hairs forming band across apex of each sternum.

Type material: Holotype male, allotype female, and 19 male and 7 female paratypes: Argentina: Tucumán Prov., 5 km east of Amaicha, 26 Nov., 1983 (R. B. Roberts) [Lawrence; paratypes in New Brunswick, Curitiba, Buenos Aires].

Other material: Additional specimens of the same or closely related species are from Andalgalá, Catamarca Prov. (IBP desert scrub site), on *Larrea divaricata* (one male on *L. cuneifolia*), 22 Oct. 1972, and 10 and 19 Oct. 1973; one from same locality, on *Bulnesia retama* (no pollen on scopae), 5 Oct. 1973 (all J. L. Neff). Capillitas Desert, Catamarca Prov., on *Larrea divaricata*, 23 Dec. 1973 (J. L. Neff). Quebrada La Aguadita, La Rioja Prov., 20 km north of La Famacina, on *Larrea divaricata*, 13 Nov. 1969 (A. Willink-Stange-A. Terán collectors). Villa del Agrio, Néuquen Prov., on *Larrea divaricata* (J. L. Neff) (male flagellum largely brown) [all Austin].

Etymology: The specific name is the Latin *pruinosus*, covered with frost, with reference to the uniformly distributed white hairs on the metasoma of the female.

Leioproctus (Leioproctus) fulvoniger
new species

This is the only known species of its subgenus in the Americas. It differs from all other American species in the characters indicated in the account of subgenera. (Figs. 5g-l, 19c)

Description: Nonmetallic black and largely dark haired, without tergal hair bands; pubescence of dorsum of thorax fulvous.

Male: Length 9 mm; forewing length 7.5 mm. *Structure.* Eyes converging below except for upper extremities which converge above. Ocelloccipital distance about 1.2 ocellar diameters; interocellar distance nearly two ocellar diameters, slightly less than ocellocular distance; distance from anterior edge of median ocellus to posterior edge of vertex less than that to antennal bases. Vertex not raised behind ocelli, gently convex seen from front. Clypeus not protuberant; clypeoantennal distance slightly more than diameter of antennal socket; malar area linear. Antennal scape not quite reaching anterior ocellus; flagellar segment 1 about as long as broad, 2 nearly twice as broad as long, 3 slightly broader than long, remaining segments longer than broad. Pygidial plate not defined, represented on T7 by shining area, impunctate and hairless distally and with well separated punctures basally. Hidden sterna and genitalia as in Fig. 5h-l. *Surface.* Head and thorax strongly punctured, interspaces between punctures

smooth, shining. Clypeus, supraclypeal area, and lower paraocular areas coarsely punctate, closely so in longitudinal central, feebly depressed part of clypeus, less closely so in narrow preapical transverse zone of clypeus (broken by punctures medially) and broad lower lateral areas; rest of head less coarsely punctate with shining, nearly impunctate areas immediately behind ocelli, between ocelli and eye, and in location of facial fovea (which is otherwise not indicated). Dorsum of thorax and sides of propodeum with punctation nearly as coarse as that of frons, mesepisternum more coarsely punctate but lower hypopimeral area and area on mesepisternum below it impunctate; metapleuron mostly impunctate. T1 and posterior zones on T2-6 shining and impunctate; rest of terga shining with only minute and widely separated punctures. Sterna largely impunctate except for broad, preapical, strongly punctured zones on S2-5 and large apical area on S6. *Color.* Black, apical half of mandible dark red; flagellar segments 2-11 dark brown except for blackish upper surface; tegula translucent light brown; small segments of tarsi, metasomal sterna, and apical bands of terga rufescent; tibial spurs red-brown. Wings, including stigma and veins, dark brown. *Pubescence.* Sparse, rather short, and brown on head; longer, denser, dark brown (or on parts of mesepisternum blackish) on sides of thorax and on propodeum; dark brown to black on legs except red-brown on under sides of tarsi; bright fulvous on dorsum of thorax and posterior lobe of pronotum; metasomal hairs short (longer on sterna), more or less erect, blackish with reddish reflections in some lights.

Female: Length 11 mm; forewing length 8 mm. Differs from description of male as follows: *Structure.* Eyes only slightly converging below. Ocelloccipital distance scarcely more than ocellar diameter. Antennal scape reaching beyond lower edge of anterior ocellus; flagellar segment 1 slightly longer than broad, 2 over twice as broad as long, 3 about twice as broad as long, 4-7 slightly broader than long, 8 and 9 about as broad as long, 10 twice as long as broad. Pygidial plate strongly rounded (not subtruncate) apically, margins strongly diverging anteriorly. *Surface.* Narrow preapical zone of clypeus impunctate and not broken medially. Center of mesoscutum with punctures in some areas separated by several puncture widths; impunctate area on mesepisternum below hypopimeral area inconspicuous. T1 and broad posterior zones on T2-5 shining and impunctate; rest of terga rather dull but with only minute and widely separated punctures, better developed on posterior terga. Sterna largely dull and minutely roughened but S2-6 with broad preapical strongly punctured zones and narrow apical impunctate shining margins. *Color.* Black; mandible, under side of apical half of flagellum, legs, metasomal sterna, and apical margins of terga dark reddish; tegula, last flagellar segment, femora, and bases of fore and mid tibiae red

brown. *Pubescence*. Fuscous hairs intermixed with brown on head, some lower clypeal hairs longer, coppery blackish; hairs on side of propodeum lighter brown, on upper part fulvous; hairs of T5 slightly longer than those of sterna; hairs of metasoma and much of legs plainly black.

Type material: Holotype male: Brazil: Santa Catarina, Corupá, Nov., 1953 (A. Maller) [Lawrence]. Allotype female: Santa Catarina, Nova Teutonia, 27°11'S, 52°23'W, 300-500 m altitude (F. Plaumann) [Lawrence].

Comments: The species name was given in manuscript (i.e., on a label) over thirty years ago by Padre J. S. Moure, associated with a new generic name. Additional specimens are presumably in Moure's collection in Curitiba, Brazil, but have not been available for study.

Etymology: Based on the Latin *fulvus*, tawny, plus *niger*, black, with reference to the striking tawny and black hair coloration.

Leioproctus (Glossopasiphae) plaumanni
new species

This species has exactly the form and coloration of *Andrena carlini* Cockerell, a common bee of eastern North America. It is superficially similar to another unusual species of *Leioproctus*, *L. (Leioproctus) fulvoniger*, from the same locality as the specimens of *L. plaumanni*. It is the only species of *Glossopasiphae* and its most distinctive features are indicated in the subgeneric description. (Figs. 6, 19d)

Description: Nonmetallic black with much black pubescence.

Male: Length 12 mm, forewing length 9 mm. *Structure*. Eyes diverging below. Ocellocipital distance about four ocellar diameters; interocellar distance over two ocellar diameters and about two thirds of ocellocular distance. Clypeus protuberant (in side view, over half eye width); clypeoantennal distance about equal to diameter of antennal socket; malar area almost linear. Antennal scape almost reaching anterior ocellus; flagellum short and rather slender, about as wide as distal part of scape, segment 1 longer than wide, segment 2 wider than long, succeeding segments progressively longer so that 9 and 10 are noticeably longer than wide; segment 11 over 1.5 times as long as wide. Second submarginal cell (2+3) only slightly shorter than first, receiving first recurrent vein about one fourth of length of cell from base. Basitibial plate with short, appressed hairs not obscuring surface. Hidden sterna and genitalia as in Fig. 6a-e. *Surface*. Head and thorax finely and rather densely punctate, punctures mostly separated by half a puncture width or less, ground between punctures finely roughened; clypeus not more coarsely punctate than rest of face, with irregular longitudinal median smoother line; vertex more finely and less closely punctate than face with impunctate area lateral to ocelli. Propodeal triangle with numerous transverse striae especially laterally, surface

roughened and rather dull. T1-5 and S1-5 with surfaces minutely roughened and with small, widely separated punctures, densest (especially on sterna) just basal to depressed marginal punctureless zones which are widest on terga. *Color*. Black; tegula translucent brown; distal half of mandible dark reddish; tibial spurs light brown; under side of flagellum, tibiae, tarsi (lighter apically), and depressed marginal zones of terga and sterna brownish black; wings grayish brown, veins and stigma brown. *Pubescence*. On head dusky, yellowish on labrum and mandible, black on face. On thorax pale yellowish, dusky laterally and ventrally. On legs and metasoma dusky, forming strong fringes on S2-5.

Female: Length 14 mm. Agrees with description of male except as follows: *Structure*. Eyes less divergent below. Clypeus protuberant over two thirds of eye width. Antennal scape reaching posterior margin of posterior ocellus; flagellum distally a little broader than scape, segments 2-9 wider than long to as wide as long, segment 10 about 1.5 times as long as wide. Basitibial plate with surface obscured by short appressed hair. *Surface*. Vertex with punctation like that of frons except close to ocelli. Propodeal triangle with transverse striae extremely fine. T5 and 6 and S2-5 with rather coarse punctures and hair bases. *Pubescence*. On head as described for male but darker, largely blackish. Upper margin of hind tibia beyond basitibial plate with hairs black. Prepygidial and pygidial fimbriae and many of lateral hairs on other terga, and hairs of S6 black.

Type material: Holotype male and allotype female: Brazil: Santa Catarina, Nova Teutonia, November 24, 1942 (Fritz Plaumann) [Lawrence]. Other specimens from the original series are believed to be in the collection at the Universidade Federal do Paraná, Curitiba, Brazil.

Etymology: This species is named after Fritz Plaumann, who collected in Santa Catarina for many years. Padre J. S. Moure provided the specific name on his labels about 1956, but has not continued work with this group. He also recognized its distinctiveness and provided an unpublished generic name.

Leioproctus (Sarocolletes) duplex
new species

This species resembles other species of its subgenus except for having two instead of three submarginal cells. It is considerably smaller than *L. (S.) rufipennis* and differs also in details of sculpturing and terminalia. (Fig. 7a-h)

Description: Nonmetallic black with punctate but shining integument and broadly translucent tergal margins; pubescence mostly brownish white, forming conspicuous apical tergal bands.

Male: Length 7-8 mm; forewing length 5.6-5.9 mm. *Structure*. Eyes converging below except upper extremities which converge slightly above. Ocelli small; ocellocipital distance over twice ocellar diameter and equal to interocellar distance

which is less than ocellocular distance; distance from anterior edge of median ocellus to posterior edge of vertex about equal to that to antennal bases. Vertex behind ocelli convex. Clypeus not protuberant; clypeoantennal distance slightly more than diameter of antennal socket; malar area linear. Labrum twice as broad as long, basal three fifths convex, convexity divided by longitudinal median depression; distal half with short hairs basal to fringe, basal half smooth, shining. Antenna almost reaching anterior ocellus; flagellum not reaching tegula, segment 1 about as broad as long, 2 and 3 much broader than long, 4-10 slightly broader than long, 11 longer than broad. Propodeum in profile declivous, "sub-horizontal" part very steeply sloping, slightly shorter than metanotum; groove defining triangular area not pitted. Wings hairy throughout, basal vein slightly distal to cu-v; two submarginal cells, second (2+3) a little shorter than first, receiving first recurrent vein about one seventh of cell length from base; jugal lobe of hind wing slightly exceeding level to cu-v. Basitibial plate rounded at apex, surface with few short hairs. Hidden sterna and genitalia as in Fig. 7a-e. *Surface*. Face below antennal level rather dull because of small, dense punctures; rest of head and thorax with punctures well separated, ground between them smooth, shining; genal area with small punctures; rest of head and thorax with punctures coarse, in most areas separated by about a puncture width; coarsest punctures on posterior part of vertex and discs of scutum, scutellum, and mesepisternum; large smooth impunctate area lateral to lateral ocellus and on hypopimeral area; propodeal triangle shining but with some fine irregularities, and with a few fine transverse striae basally. Metasoma shining but surface finely roughened, punctures rather small, on terga separated by one or two puncture widths, on sterna by several puncture widths; posterior margins of T1-5 and S1-6 broadly depressed, impunctate. *Color*. Black, apical third of mandible dark red; under side of flagellar segments 3-11 brown; front tibia and tarsus reddish-brown; mid and hind tarsi dark brown; tegula and posterior margins of terga and sterna translucent yellow-brown. Wings light yellow-brown, veins and stigma brown. *Pubescence*. Pale yellow-brown, long, nearly hiding surface on lower half of face, erect on discs of terga and sterna, forming transverse preapical bands of decumbent hair partly hiding depressed margins of T1-5 and S2-6; T6-7 largely covered with similar hair but T7 with median bare area (see subgeneric description).

Female: Length 7.5 mm; forewing length 5.7 mm. Similar to male except as follows: *Structure*. Eyes only slightly converging below, minimal distance between them about equal to eye length. Labrum a little more than twice as broad as long; convexity stronger than in male, occupying little more than half of labral surface, only weakly depressed medially; distal third with few short

hairs basal to fringe; surface dull. First flagellar segment about 1.5 times as long as broad. Basitibial plate more densely hairy but marginal carina exposed. Pygidial plate rounded at apex. *Surface*. Lower half of face slightly more coarsely punctate, like frons. Disc of scutum with large impunctate area, of scutellum with sparsely punctate area. S2-5 with coarse hair bases instead of fine punctures. S1-6 with only narrow impunctate depressed margins. *Color*. Entire mandible dark red. Legs largely dark brown. *Pubescence*. Shorter than in male, not hiding facial surface; area beyond basitibial plate with a few dusky hairs; upper margin of hind basitarsus with dusky hairs; short, erect white hairs on discs of T2-4; hairs of T5-6 reddish dusky, rather long; no pale band on T5; sternal scopa of very long, pale yellowish hairs on T2-5.

Type material: Holotype male, allotype female, and seven male paratypes: Argentina: Santa Fe Prov., Colonia Masoias, Departamento Garay, 22 October, 1942 (collector unknown) [Lawrence; two male paratypes, Buenos Aires].

Etymology: The species name, *duplex*, refers to the two submarginal cells.

Leioproctus (Holmbergeria) cristariae (Jörgensen)

Holmbergeria cristariae Jörgensen, 1912:100.

I am indebted to Dr. Ricardo Ronderos [La Plata] for the loan of two specimens (on one pin) bearing the collection and identification labels of Jörgensen (the latter, in Jörgensen's handwriting according to Arturo Roig-Alsina, reads *Holmbergeria* (sic) *cristariae*), and a lectotype label by Ogloblin with the notation "el ejemplar superior." Since Ogloblin did not publish this lectotype designation, I hereby accept and validate it and have attached a label accordingly; the upper specimen on the pin is the lectotype. The lower specimen is the same species.

Leioproctus (Pygopasiphæ) mourellus new species

This species is markedly smaller than *L. (P.) wagneri*, the other named species of the subgenus, and is further differentiated by the simple hind trochanters and tibiae of the male, the four or five teeth on the inner hind tibial spur of the female (instead of two or three, as in *L. wagneri*), and other variables as indicated in the subgeneric description. (Figs. 8a-f, 10h)

Description: Nonmetallic black, pubescence whitish or yellowish, forming apical tergal pale bands in male which are scarcely evident in female, but tergal surfaces of both sexes with white hair.

Male: Length 7-8 mm; forewing length 5.5 mm. *Structure*. Eyes converging below except for upper extremities which converge above. Ocellocular distance about 1.8 ocellar diameters; inter-ocular distance nearly three ocellar diameters,

more than ocellocular distance; distance from anterior edge of median ocellus to posterior edge of vertex less than that to antennal bases. Vertex convex behind ocellar area. Apex of labrum broadly emarginate. Clypeus little protuberant, clypeoantennal distance 1.5 times diameter of antennal socket; malar area linear. Antennal scape not reaching anterior ocellus, first flagellar segment about 1.5 times as long as broad, succeeding segments progressively longer, middle segments about 1.8 times as long as broad. Pygidial plate shining, rounded posteriorly, defined by carina distally, not narrowed anteriorly. Hidden sterna and genitalia as in Fig. 8a-d, f. *Surface*. Punctures rather fine, mostly separated by two or more puncture widths of smooth ground but those of lower 3/4 of face, posterior margin of vertex, genal area, posterior margin of scutellum, side of propodeum and S6 dense; ocellar-ocular area, posterior central part of scutum, anterior central part of scutellum, much of hypoepimeral area, and propodeal triangle smooth, shining, impunctate. T1 and S1 and 2 with punctures especially fine, separated by many puncture widths. Posterior marginal zones of terga and sterna with punctures a little finer than elsewhere, sparse, not reaching margins proper, on S3-5 denser apically than elsewhere. *Color*. Black or brownish black, metasoma dark brown; apical half of mandible red; flagellum brown above, yellow-brown beneath; tegula translucent testaceous; tarsi, front and mid tibiae, apex of hind tibia yellow-brown. Wings clear, veins and stigma light-brown. Apical margins of T1-6 brownish translucent. *Pubescence*. Long and more or less erect, yellowish white dorsally, yellow on face, nearly white ventrally, hiding face below antennae, forming apical bands of appressed white hair on T2-4, bands weaker on T1, 5, 6, other parts of terga with rather sparse, sloping or suberect, rather long white hair; apical fringes of somewhat yellowish hair on S2-4, longer and denser on S5.

Female: Length 10-11 mm; forewing length 6.0-6.8 mm. Differs from description of male as follows: *Structure*. Inner margins of eyes scarcely converging below, upper parts converging above. Elevated basal part of labrum with strong transverse carina. Interocellar distance less than three ocellar diameters. Antennal scape reaching lower edge of median ocellus, first flagellar segment about 1.4 times as long as maximum width, second much broader than long, third about as long as broad, other segments slightly longer than broad. Pygidial plate minutely roughened, dull, apex rounded, lateral margins strongly diverging anteriorly, in dry specimens margins appear weakly carinate but cleared preparation shows carina only across apex of plate, elsewhere only a change of surface orientation and vestiture from bare flat plate to steeply sloping hairy surface. *Surface*. Head, especially clypeus, supraclayal area, lower paraocular areas, and lower parts of genal areas with punctures coarser than in male,

separated by about a puncture width. T1-4 except laterally with punctures extremely fine and widely separated; T5 with punctures much coarser and closer. S1-5 with punctures (or hair bases) coarser than in male but absent from basal part of each sternum which is minutely reticulate. *Color*. Flagellum brownish black, paler apically, under side of segments 3-10 light brown. Legs brown, anterior side of front tibia yellow-brown. *Pubescence*. White except yellow on dorsum of thorax, long on face but not hiding surface except for parts of paraocular area, not forming bands on metasomal terga but surfaces of T2-4 and base of 5 with appressed white hair not hiding surface; prepygidial and pygidial fimbriae light brown; sternal hairs whitish, only S5 with conspicuous fringe.

Type material: Holotype male, allotype female, eight male and three female paratypes: Argentina: Catamarca Prov., Andalgalá (IBP desert site), (J. L. Neff, collector). Primary types, [Lawrence]. Paratypes, [Austin], 4 males, 2 females; [Lawrence], 2 males, 1 female; [Buenos Aires], 2 males. All were at flowers of *Prosopis chilensis* except one male at *Prosopis flexuosa*. The holotype was taken on Oct. 18, 1973, the allotype on Oct. 22, 1973. Paratypes were taken on both of those dates and on Oct. 24 and 29, 1972.

Additional specimens: Two specimens taken with the paratypes are stylopized and sexually anomalous. Two females, also taken by J. L. Neff at the type locality on Oct. 29 and Nov. 4, 1972, on flowers of *Prosopis chilensis*, differ from the typical form in having the legs (except coxae and trochanters) and metasoma yellowish red [Austin]. A similar specimen from the same locality, Nov. 4, 1972, was taken on *Prosopis alba* by G. E. Bohart [Logan]. This appears to be a color morph of *L. mourellus*.

Etymology: The specific name is in honor of Padre J. S. Moure of Curitiba, Brazil, who recognized this species as new and left specimens with this indication in the collection of J. L. Neff, to whom I am indebted for the opportunity to study this and many other interesting Paracolletini.

Leiproctus (Halictanthrena) malpighiacearum (Ducke)

Halictanthrena malpighiacearum Ducke, 1907:364.

At least two "types" (cotypes) of this species exist, a male and a female [Berlin]. Since the female was described most fully, it is here designated as the lectotype. Its labels in Ducke's handwriting read "Barbacena 21-10-1905 Ducke" and "*Halictanthrena malpighiacearum* Ducke typ ♀." Other labels are "*Lonchopria malpighiacearum* Ducke, ♀, det. J. D. Alfken, 1928" and on red paper, "Typus." I have added a red lectotype label with the name and my name. The male, from the same locality, was collected on "8-11-1905."

Leioproctus (Protodiscelis) fiebrigi
(Brèthes)

Protodiscelis fiebrigi Brèthes, 1909:246.

There are problems with the original description and type material of this species, the type species of *Protodiscelis*. The so-called female described as having simple mandibles (see Brèthes' generic description), simple hind tibial spurs, and short hairs on the hind tibia must have been a male. The "allotype" [Buenos Aires] is a male and appears to be in reality the holotype; I have added a label to that effect. It was probably labeled as the allotype by someone who recognized it as a male and did not check the characters given by Brèthes. The male described by Brèthes had yellow on the clypeus, lower paraocular areas, and pronotal lobes, unlike any American colletine bee. Probably it was a panurgine bee with retracted mouthparts so that Brèthes did not recognize it as an andrenid rather than a colletid bee. Brèthes' male specimen appears to be lost. In any case it is the "female" that he described in detail and that should carry the name. Clearly the "female" was the main specimen used in writing the generic description, the simple mandibles and large maxillary palpi being especially diagnostic.

The holotype ("allotype") lacks middle legs and one hind leg; the other hind leg was hanging loose and is now detached and glued to the label, which reads "San Bernardino, Fiebrig."

Leioproctus (Protodiscelis) spathigerus
new species

This species resembles other species of its subgenus in appearance, but differs in having the middle tibial spur broad, sheath-like (Fig. 12m, n), and the hind tibial spurs slightly modified in the same direction. The male is unknown. (Fig. 12j-o)

Description: Nonmetallic black except for brownish areas as described below; brownish posterior margins of metasomal terga combine with slightly longer hair to suggest weak metasomal banding.

Female: Length 6 mm; forewing length 5 mm.

Structure. Eyes rather slightly converging below except for subparallel upper extremities. Ocellocapital distance nearly equal to ocellar diameter; interocellar distance about two ocellar diameters, slightly < ocellular distance; distance from anterior edge of median ocellus to posterior margin of vertex only about half that to antennal bases. Vertex behind ocelli convex, not elevated. Clypeus not at all protuberant; clypeoantennal distance nearly twice diameter of antennal socket. Antennal scape not quite reaching anterior ocellus; flagellum short, wider than scape, segment 1 as long as broad, 2 and 3 about twice as wide as long and 4 nearly so, remaining segments wider than long except last which is about 1.3 times as long as wide. Propodeum in profile with base somewhat sloping, longer than metanotum.

Forewing with basal vein meeting cu-v, submarginal cell 2+3 slightly shorter than 1, receiving first recurrent vein near base; apex of marginal cell sharply truncate with distinct appendage. Jugal lobe of hind wing slightly exceeding level of cu-v and about two thirds as long as vannal lobe measured from base. Basitibial plate with apex narrowly rounded, surface largely covered with short appressed hairs except for strongly carinate margins. Middle tibial spur almost as long as basitarsus, broad and flat, widest near middle, margins apparently entire although with a pattern of lines suggestive of teeth; hind tibial spurs similarly flattened but more slender, margins toothed, inner margin of inner spur finely pectinate. Pygidial plate rounded at apex, surface medially near apex convex, roughened, a broad, concave, shiny, marginal zone both laterally and posteriorly between convex area and strong marginal carina. **Surface.** Punctures of clypeus and supraclypeal area coarse, separated by several puncture widths of smooth, shining ground, except laterally where they become finer and close. Paraocular area unusually convex, shiny, with widely separated punctures similar to those of clypeus but finer. Frons with finer and closer punctures; vertex and genal area with very fine, widely separated punctures. Scutum with punctation of anterior and lateral parts similar to that of frons but center posteriorly, also scutellum, with coarser and more widely separated punctures like those of paraocular convexity. Disc of mesepisternum with similar coarse and widely separated punctures; other mesepisternal areas more finely punctate; ground between punctures of head and thoracic areas described above smooth and shining. Metepisternum and sides of propodeum minutely roughened, without distinct punctures. Propodeal triangle shining but minutely roughened. T1 and 2 shining with minute, widely separated punctures (few on T1) dorsally, more laterally; remaining terga with more but also minute punctures (and hairs), extending unmodified onto broad, depressed apical marginal zones. Sterna much more coarsely and closely punctured. **Color.** Integument black, undersides of flagellar segments 3-10 and tibial spurs light brown; mandible except base red; tegula and legs dark brown or brownish black (small segments of tarsi reddish brown); broad posterior margins of T1-4 and narrower margin on T5 translucent brown. Wings light brown, veins and stigma brown. **Pubescence.** Short, longest on sides of thorax (especially upper lateral part of propodeum), S2-5 and scopa, nowhere hiding surface. Hairs dull white on lateral and ventral surfaces and on bases of legs including femora, pale brown elsewhere, darker brown with longer hairs dusky on vertex, scutum, scutellum, T4-6 and sides of T2-3; scutum with extremely short, appressed brown hairs and sparse, longer, erect dusky hairs; scopal hairs around basitibial plate and beyond plate on upper margin of hind tibia blackish; T1 without hairs middorsally (as seen in profile);

preapical hairs of terga slightly longer than more basal hairs but not dense or pale enough to form distinct hair bands.

Type material: Holotype female and five female paratypes: Brazil: Estado de São Paulo, Rio Claro [Lawrence]. Two other female paratypes, same locality, one dated December, 1943, the other January, 1944 [Lawrence]. Additional specimens are in [Curitiba].

Comments: Padre J. S. Moure placed the species in a new genus because of the peculiar middle and hind tibial spurs, but the lack of other distinctions from *Protodiscelis* indicates its affinities. I consider *L. spathigerus* as a species of *Protodiscelis* remarkable only in this one character.

Etymology: The specific name of this species was provided by Padre J. S. Moure who labeled specimens before 1955. It means the bearer of a sheath, with reference to the broad, sheath-like middle tibial spur.

Leioproctus (Tetraglossula) anthracinus
new species

In this black bee, the pubescence is all black or dusky, except dull whitish on the face and genal area; metasomal scopa of female also whitish. Because of its size and black aspect, it has been misidentified in collections as *L. (Hoplocolletes) ventralis*.

Description: Nonmetallic black with much black pubescence.

Male: Length 10-11 mm, forewing length 8-8.5 mm. *Structure.* Eyes slightly diverging below. Ocellocipital distance about three ocellar diameters, interocellar distance over 2.5 ocellar diameters and shorter than ocellocular distance. Vertex behind ocelli raised, convex. Clypeus slightly protuberant (in side view less than half eye width); clypeoantennal distance more than diameter of antennal socket; malar area almost linear; genal area wider than eye seen from side. Antennal scape reaching middle of anterior ocellus; flagellum short, reaching pronotal lobe, slender basally but wider than scape distally, segment 1 1.5 times as long as wide, segments 2-10 wider than long, segment 11 about 1.3 times as long as wide. Second submarginal cell (2+3) about as long as first, receiving first recurrent vein near base. Basitibial plate with short hairs not obscuring surface. Hidden sterna and genitalia similar to those of *L. (T.) fuscus* (Fig. 13a-e) but S7 with upper apical lobes broader and hairier, lower preapical lobes hairy throughout and especially on mesobasal angles which are bare in *fuscus*; volsella longer than wide, apex acute although rounded. *Surface.* Punctures of head and thorax moderate sized, well separated by smooth ground; those of clypeus scarcely coarser than elsewhere on face and dense along lower margin; of mesepisternum and scutum coarser than elsewhere, on scutum separated by more than a puncture width; of vertex posteriorly and laterally, genal areas, and sides of propodeum with

only minute, well separated punctures; large, shining impunctate area lateral to ocelli and occupying upper part of paraocular area; longitudinal impunctate zone in front of median ocellus. Scutellum with impunctate dorsolateral area. Propodeal triangle shining, with minor irregularities and a few transverse striae basally; pits in marginal groove transversely elongated. Metasomal terga with punctures separated by several puncture widths of shiny ground, on T1 and 2 only slightly smaller than those of clypeus, on other terga progressively finer; posterior marginal zones of terga and sterna broad, depressed, without or with scattered minute punctures. S2-5 with rather coarse, widely separated punctures on polished ground, S6 with surface minutely roughened between scattered punctures. *Color.* Black with flagellum (paler beneath), tegula, legs, and much of metasoma slightly brownish; tibial spurs dark brown; scape, genal area, side of thorax and propodeal triangle sometimes also brownish; mandible red preapically. Wings brown, veins and stigma dark brown. *Pubescence.* Dusky blackish, that of face and genal and hypostomal areas gray or dull whitish. S5 with strong black apical fringe, lateral hairs longest and curved mesad.

Female: Length 9.5-11.5 mm. Agrees with description of male except as follows: *Structure.* Inner margins of eyes about parallel. Genal area about as wide as eye in side view. Flagellar segment 9 about as long as broad, 10 over 1.5 times as long as broad. Basitibial plate with surface partly hidden by appressed hair. *Punctuation.* Clypeal and supraclypeal punctures coarser than those of rest of face, dense on lower part of clypeus, largest punctures nearly as large as scutal punctures but much closer together; clypeus with irregular longitudinal median impunctate line; scutal and scutellar punctures, except for margins, separated by two or more diameters. T1-3 with only minute, widely separated punctures, larger and denser laterally; T4 with more punctures, especially laterally; T5 with abundant large punctures on minutely roughened ground. S1 almost impunctate, S2-5 with coarse, well separated punctures (bases of scopal hairs), S3-5 with surface minutely roughened at least in certain areas, S6 with dense small punctures apically, surface minutely roughened. *Color.* Distal half of mandible variably dark red. *Pubescence.* S2-5 with scopa of long, dull white hairs; S5 with dark apical fringe shorter than in male and largely hidden by pale scopal hairs.

Type material: Holotype male, allotype female, and seven male and five female paratypes: Brazil: Estado de São Paulo, São Carlos, April 1, 1956 (C. D. Michener) [Lawrence; a pair of paratypes, Curitiba]. One male paratype: Paraná, Curitiba, January 28, 1968; one male and two female paratypes: same locality, January 10 and 20, 1964, and April 11, 1963 (S. Laroca) [Lawrence].

Etymology: The specific name is a Latin adjective meaning coal black.

Leioproctus (Tetraglossula) fuscus
new species

This species differs from other species of its subgenus by the partly to largely red metasoma. The pubescence is pale (light brown to whitish) except for some dusky hairs on the legs and metasomal apex of the female. In form and coloration this species is like females of *L. (Perditomorpha) brunerii*. (Figs. 13, 16f)

Description: Nonmetallic black with metasoma largely red; pubescence largely pale.

Male: Length 6.5-9.5 mm (holotype 9 mm), forewing length 5.5-7 mm (holotype 7 mm). *Structure.* Inner orbits parallel. Ocellocipital and interocellar distances nearly three ocellar diameters, ocellular distance slightly more. Vertex behind ocelli raised, convex. Clypeus scarcely protuberant (in side view less than half eye width), lower margin produced downward as rounded median lobe; clypeoantennal distance slightly less than diameter of antennal socket; malar area almost linear; genal area as wide as eye seen from side. Antenna as described for *L. (T.) anthracinus* but flagellar segment 11 sometimes (in holotype) over 1.5 times as long as wide. Second submarginal cell (in holotype) shorter than or equal to first, receiving first recurrent vein near base. Basitibial plate with short hairs not obscuring surface. Hidden sterna and genitalia as in Fig. 13a-e. *Surface.* Head and thorax with punctures of moderate size, surface between them smooth and shining; clypeal punctation not coarser than that of adjacent areas; extreme side of clypeus near mandibular base impunctate; ocellar area, laterally to eye, and area around summit of eye and down along inner orbit with only widely separated, minute punctures but convex part of vertex behind ocelli strongly punctured; disc of mesoscutum and scutellum with punctures more widely separated than on head; punctures coarsest on convex part of vertex and discs of mesoscutum, scutellum, and mesepisternum; posterior part of disc of scutum and either side of midline of scutellum with irregular impunctate areas; margins of these sclerites more finely and coarsely punctate. Propodeum with triangle shining but weakly, minutely roughened; rest of surface with minute roughening, strongest posterolaterally where surface is dull and punctation strong; punctures fine anterolaterally. T1 disc with rather fine punctures separated by three or four puncture widths; remaining tergal discs with punctures finer and somewhat closer; posterior marginal depressed areas T1-6 broad, with much finer punctures than discs, becoming impunctate near margins proper. Pygidial plate shining, finely and irregularly roughened. S1-5 shining but minutely roughened with widely separated hair bases; S1-4 with broad, hairless and impunctate posterior margins. *Color.* Head and thorax black, mandibles and legs reddish brown with basal parts darker; flagellum brown, black on upper surface of first three or four segments;

posterior lobe of pronotum dark reddish brown; tegula translucent yellow brown. Wings slightly brown, veins and stigma brown. Metasoma with sterna and bases and apices of terga yellowish red, broad central, ill-defined, transverse zone of each tergum dusky brown to blackish, the zone on T2 ending in large lateral black spot; anterior terga generally with more yellowish red than posterior terga so that dusky zone is sometimes absent or weak on T1 and rather narrow on T2; rarely terga brownish black except for yellowish posterior bands; depressed marginal zones of T1-5 broadly translucent yellowish. *Pubescence.* Ochraceous on dorsum and on tibiae and tarsi, dull whitish elsewhere, abundant but not entirely hiding surface on face and genal area, elsewhere sparser except abundant, short, of uniform length, rather dusky and not forming bands on terga; S1-5 with long, sparse hair, not forming bands except for long apical fringe on S5, its hairs longest laterally and directed mesad.

Female: Length 8.5-9 mm. Agrees with description of male except as follows: *Structure.* Ocellocipital and interocellar distances about 2.5 ocellar diameters. Clypeus more protuberant (more than half eye width, lower margin with truncation about one third as wide as clypeus, median marginal lobe absent. Pygidial plate with apex broadly rounded. *Punctuation.* Clypeus with longitudinal median impunctate line; impunctate areas of scutum and scutellum larger than in male; terga more sparsely and minutely punctate than in male, T1 almost impunctate, smooth and shining. S2-5 with hair bases very large. *Color.* Flagellum dark brown above, lighter brown beneath. Posterior lobe of pronotum almost black. *Pubescence.* Slightly less dense on face than in male; short tergal pubescence sparse on T1; outer surfaces of fore and mid tibiae with hairs dusky in some lights; outer margin of hind tibia and basitarsus with blackish hairs, leg scopae otherwise yellowish white; prepygidial and pygidial fimbriae dusky; metasomal scopae yellowish white.

Type material: Holotype male, allotype female, and 55 male and 7 female paratypes: Brazil: Estado de São Paulo, São Carlos, April 1, 1956 (C. D. Michener) [Lawrence; paratypes in Curitiba, Washington, New York].

Other material: 16 males, 4 females from Brazil: Estado de Pará, Cachimbo, June, 1962 [Lawrence]. In these specimens the antenna and legs are largely red, the metasoma is entirely yellowish red except the blackish spot at side of T2 or T4-7 of male are largely blackish, and the dusky and blackish hairs are paler than in specimens from São Carlos.

Etymology: The specific name is a Latin adjective meaning painted or colored, with reference to the usually partly or wholly red metasoma.

Leioproctus (Nomiocolletes) simplicicrus
new species

This species is described here because it pos-

sesses some of the attributes of *Nomiocolletes* while at the same time possessing features of the probably primitive *Leioproctus* such as *Chilicolletes*. The small size, simple hind legs and relatively slender metasoma distinguish the species immediately from other *Nomiocolletes*. Additional specific characters are indicated in the subgeneric description. (Fig. 18)

Description: Black, nonmetallic, with largely red legs and greenish yellow apical integumental metasomal bands.

Male: Length 8 mm; forewing length 6.8 mm. *Structure.* Eyes converging below except for subparallel upper extremities. Ocelloccipital distance over three ocellar diameters; interocellar distance almost three ocellar diameters, less than ocellular distance; distance from anterior edge of median ocellus to posterior edge of vertex about equal to distance to antennal bases. Vertex broad but not raised behind ocelli. Clypeus flat, not protuberant as seen in profile; clypeoantennal distance slightly greater than diameter of antennal socket; malar area linear. Antennal scape short, apex not closely approaching anterior ocellus; flagellar segment 1 about as long as broad, segment 2 about 1.3 times as long as broad, middle segments over 1.5 times as long as broad, segments 2-11 with broad zone on inner side marked by three longitudinal ridges and sparse rather than dense minute hairs. Pygidial plate absent, represented by undefined longitudinal zone more shiny, less closely punctate, and less hairy than adjacent areas. Hidden sterna and genitalia as in Fig. 18a-e. *Surface.* Body closely and strongly punctured; areas with minutely roughened interspaces between punctures, mostly less than a puncture width, behind summit of eye, scutal disk and especially front end of scutum, mesepisternum below scrobal suture, and posterior surface of propodeum, metasomal sterna and extreme sides of metasomal terga; punctures coarsest on scutum and mesepisternum below scrobal suture, finest on metasoma; propodeal triangle minutely roughened, dull, subhorizontal surface with roughly 16 irregular longitudinal rugae (lateral ones sloping mesad) separating small depressed areas that are not delimited posteriorly; metasomal terga and sterna with narrow impunctate posterior margins, terga with colored bands mostly twice as wide as impunctate bands. *Color.* Black, mandible infuscated reddish; tegula infuscated dark brown, black anteriorly; legs red, mid basitarsus yellowish. T1-5 with apical pale yellow bands; basal two-thirds of each band punctate on T1, 2; only a few punctures in band of T5; T3-4 intermediate. S1-6 infuscated dark reddish brown. Wings dark brownish, veins and stigma brownish black. *Pubesence.* Short, weak, dull yellowish, not forming tergal bands; S5 with apical fringe of yellowish hair. Lower half of face with golden hair partly obscuring surface; metasomal tergal hair especially short.

Holotype male: Perú: Loreto Prov., Pucallpa, 200 m altitude, June 20-30, 1965 (J. Schunke)

[Lawrence]. The wings of the specimen were badly folded and stuck together so that the venation was invisible; those of one side were removed, cleaned in water, dried, and glued to a card below the specimen.

Etymology: The specific name is formed from the Latin *simplex*, simple, plus *crus*, leg, with reference to the ordinary hind leg which contrasts with that of other species of the subgenus.

Lonchorhyncha ecuadoria (Friese) new combination

Diphaglossa ecuadoria Friese, 1925:10.

This species, the only species of its genus, has not been reported since its description from one female in 1925. It is now known from both sexes (one specimen each). The following are descriptive notes to supplement Friese's description and the generic description. (Figs. 22a-i, 23a-d, 31c)

Description: Female: Length 12.5 mm; forewing length 8.5 mm. *Structure.* Inner orbits converging above at upper ends, upper ends of eyes conspicuously bulging above adjacent part of vertex; rest of inner orbits feebly converging below; distance between eyes least at upper ends. Ocelloccipital distance about 0.5 ocellar diameters; interocellar distance slightly over an ocellar diameter and about 0.6 times ocellular distance; distance from lateral to median ocellus about 0.3 ocellar diameters. Antennal scape reaching median ocellus, apex about as wide as flagellum. Pygidial plate narrowly rounded-subtruncate at apex, lateral marginal zone shining and slightly depressed relative to median, roughened, elevated zone, margin proper sharply carinate. *Surface.* Clypeus with distinct punctures mostly separated by two or three puncture widths of minutely roughened ground, lower lateral part of clypeus more shining and impunctate (lower median part of clypeus destroyed). Punctures of head and thorax otherwise minute and inconspicuous because of minutely roughened, dull ground. Metasoma slightly more shiny than thorax but surface minutely roughened; punctures minute, well separated, coarser on sterna than terga but basal parts of S2-4 almost without punctures and hairs; T1-4 and S1-5 with narrow, apical, hairless, rather shiny margins. *Color.* Black, distal part of mandible red brown; tegula brown; legs brownish black basally, progressively lighter brown distally so that small tarsal segments are almost testaceous; apices of front and middle femora and bases of corresponding tibiae, also anterior side of front tibia, light brown; extreme apical margins of terga and sterna somewhat pallid. *Vestiture.* Hairs of head, scape, thorax, first metasomal tergum, coxae, trochanters, and femora long, fine, plumose, pale fulvous; longest hairs of vertex, paraocular areas, scape, and dorsum of thorax and T1 with distal parts dusky or blackish; hairs dense but not completely obscuring surface except around antennal base and side of propodeum; hairs of clypeus and genal area shorter,

nearly simple, sparse; distal margin of clypeus with fringe of long yellow hairs; mandibular hairs yellow; tibial and tarsal hairs yellow-fulvous, coppery on under sides of tarsi, dusky on outer sides of fore and mid tibiae and basitarsi, black on outer side of hind tibia and basitarsus (also on apex of femur). Propodeal triangle conspicuous because of being hairless. Wings yellowish dusky, distal margin darker, veins and stigma brownish black. T2-4 uniformly covered with short black hair except for apical pale fulvous band on T4. T5 and T6 with long, dense, plumose dusky fulvous hair. Sterna with rather long yellowish fulvous hair, coppery apically on S4 and especially on S5 and 6, forming dense apical bands on S2-5.

Male: Length 11 mm; forewing length 8 mm. Agrees with description of female except for usual features and the following: *Structure.* Inner orbits more strongly converging below so that eyes are as close below as at upper ends. Ocellocapital distance nearly equal to ocellar diameter; distances between ocelli slightly more than in female. Antennal scape not quite reaching median ocellus. Pygidial area described for the genus. S6 rounded posteriorly with longitudinal median depressed, almost hairless area. *Surface.* Clypeal punctures large, indistinct, shallow, so that surface is vaguely reticulate and longitudinal median area slightly depressed; lower part not as smooth as in female, whole clypeus dull like much of head and thorax; upper paraocular area and vertex more shining than in female. Metasoma with surface shining, little roughened, with punctures coarser than in female, on terga fine and separated by over a puncture width, on sterna coarser, more uniformly distributed than in female, widely separated, fine and close only on S6. *Color.* Legs darker than in female, small tarsal segments brown; femora and tibiae black or brownish black except for brown anterior side of front tibia; apical margins of terga and sterna brown. *Vestiture.* Hair of head and thorax fulvous (possibly faded in female), many hairs of vertex, scape, paraocular area, and scutum largely dusky or black instead of only black tipped; femoral hairs (especially on mid femur) short, not long as in female; clypeal fringe less prominent than in female; labrum with apical fringe of coppery bristles; tibial and tarsal hairs as described for front and mid legs of female. T2-4 and base of T5 with short black hair, short and fulvous on distal half of T5, and on T6 and 7, T7 with a few long hairs arising on either side of apex of pygidial area. S1-3 with sparse moderately long yellowish hair, shorter and somewhat dusky on S4, and 5; S6 with denser short fulvous hair except on longitudinal median depressed area.

Holotype female: Guayaquil, Ecuador, April, 1923, on *Cucurbita* (Buchwald) [Berlin]. The mouthparts including the labrum of the female type have been removed at some time and in the process the lower part of the clypeus was largely broken off. These parts apparently have been lost;

at least they cannot be found in the Berlin museum.

Other material: One male, Saraguro, south of Cuenca, Azuay, Ecuador, Nov. 29, 1970, 2900 m altitude (L. Peña) [New York].

Comments: The male and female are so similar in appearance and in the remarkable cephalic generic characters that there can be no doubt that they are conspecific.

Eulonchopria (Eulonchopria) oaxacana Michener

The only Central American record for the genus is as follows: One male and one female, Nicaragua: 1 mi (1.6 km) north of Ciudad Darien, Matagalpa Province, 500 m altitude, 25 Sept. 1975, on *Acacia* (J. L. Neff) [Austin].

Lonchopria (Lonchoprella) annectens new species

This small, dull species has a *Leioproctus*-like tibial scopa, unique in *Lonchopria*. (Figs. 24, 31e)

Description: Nonmetallic black with pubescence largely pale, sparse but widely scattered on metasomal terga so that tergal bands are absent.

Male: Length 7.5-8 mm, forewing length 5.5-5.7 mm. *Structure.* Eyes strongly converging below except for upper extremities which converge above. Ocellocapital distance about 1.8 ocellar diameters; interocellar distance nearly three ocellar diameters, greater than ocellocular distance; distance from anterior edge of median ocellus to posterior edge of vertex little more than half that to antennal sockets. Vertex behind ocelli slightly raised, convex. Clypeus protruding less than half of eye width in front of eye; clypeoantennal distance greater than diameter of antennal socket; malar area extremely short, almost linear. Labrum over twice as broad as long, apex somewhat produced, narrowly rounded; basal half elevated, convex, shining impunctate, depressed medially so that elevation is weakly binodulose; apical fringe shorter than labrum. Mandible with rounded preapical ventral angle and with strong preapical tooth on upper margin (Fig. 24j). Glos-sal lobe about as long as basal width; labial palpus less than one third as long as prementum; maxillary palpus with most of last two segments beyond apex of galea. Antennal scape not reaching anterior ocellus; flagellum reaching scutellum, as wide as widest part of scape, of uniform width, first two segments subequal in length, slightly longer than broad, segments 3-10 about 1.5 times as long as broad, segment 11 nearly twice as long as broad. Line margining propodeal triangle unpitted or finely pitted anterolaterally. Second submarginal cell with posterior margin longer than that of third; closed cells of wings with hairs sparse, especially basal to basal vein and cu-v; jugal lobe of hind wing reaching or exceeding cu-v, over two thirds as long as vannal lobe. Basitibial plate shiny, hairless, defined by carinae, apex rounded. S6 with broad gentle longitudinal median convexity, shiny and with few hairs in basal two thirds, closely punctate with diverging hairs

laterally; apex medially produced (if transparent hairless margin is ignored), rounded. T7 rounded, densely hairy laterally, with shiny, nearly hairless (but punctate) dorsal area which is narrowed posteriorly. Terminalia as in Fig. 24a-e. *Surface.* Clypeus with distal third impunctate except laterally, the rest punctate, closely so in upper part of depressed median area, shiny with punctures separated by more than a puncture width on convex lateral areas; large triangular part of supraclypeal area nearly impunctate, shining; rest of head finely and closely punctate, longitudinally strigose punctate on frons. Thorax with punctures mostly coarser than those of head, separated by a puncture width or more on anterior half of scutum, rest of scutum (except laterally) and disc of scutellum impunctate, shining; mesepisternum coarsely punctate, lower half vertically strigose, hypopimeral area impunctate; propodeum at sides coarsely and shallowly punctate, posterior dorsolateral area with large, shiny, nearly impunctate region lateral to triangle, triangle smooth and shiny. Metasomal surface shining but minutely roughened; widely separated minute punctures on terga, smaller on broad, depressed, posterior tergal margins; scattered coarser punctures on sterna. *Color.* Black, apex of mandible and of labrum reddish; distal parts of legs, depressed margins of terga, sterna, brownish black; under side of flagellum dark brown; tegula transparent testaceous; tibial spurs testaceous; wings clear with veins and stigma brown. *Vestiture.* Dull grayish white, dusky on apicolateral parts of T7; face with hairs long and white, dense enough to partly obscure surface, those arising near base of clypeus directed downward and nearly hiding clypeus; hypostomal area with long white hair; impunctate parts of scutum and scutellum hairless; T1 with erect hairs similar to those of thorax, T2-5 and apex of T1 with sparse, appressed white hair in addition to sparse suberect hairs that appear dusky in some lights, white in others; S1-5 with hair denser on margins, thus forming apical fringes, that of S5 especially dense and slightly yellowish; lateroapical areas of T7 with dense, short, dusky hairs.

Female: Length 9 mm, forewing length 6.5 mm. Agrees with description of male except for usual sexual features and the following: *Structure.* Ocelloccipital distance about one ocellar diameter. Labrum about twice as broad as long, basal two fifths strongly elevated to strong transverse carina. Mandible without ventral, preapical expansion, preapical upper tooth small. Antennal scape reaching beyond middle of median ocellus; first and tenth flagellar segments longer than broad, second and third broader than long, fourth to seventh about as long as broad, eighth and ninth slightly longer than broad. Basitibial plate mostly hidden by short hair but marginal carinae exposed, apex blunt pointed; outer hind tibial spur simple, untoothed. *Femoral scopa sparse, hairs anterior to femoral corbicula with a few long apical*

branches of about equal length, no single rachis; hairs posterior to femoral corbicula simple except for five or six long basal hairs with apical and preapical lateral branches directed distad; trochanteral hairs sparse, curved apicad, with short, sparse branches distally, directed distad. Tibial scopal hairs sparse, not hiding surface, those on lower margin of tibia curved distad and upward, these and those of most of outer surface of tibia with long apical and subapical branches and no recognizable distal rachis, those of upper margin with lateral branches directed distad along a strong rachis. Hind basitarsis with hairs on outer surface rather sparse, a little longer than those of inner surface, so that superficially the outer basitarsal surface resembles the outer tibial surface. Surface. Clypeus punctate throughout, lower two fifths and broad convex lateral area sparsely so and shining. Mesepisternum more finely punctate, not strigose, punctures of lower part separated by a puncture width or more of dull, minutely roughened surface. Dorsolateral part of propodeum shining, with widely separated punctures. *Color.* Labrum red. Mandible, clypeus, sides of thorax, legs, and metasoma reddish black. Under side of flagellum brown. *Vestiture.* Facial hairs less dense than in male, not hiding surface. Hair on outer side of front tibia dusky; on outer sides of mid and hind tibiae, on apex of hind femur, and on outer side of hind basitarsus black; sparse suberect hairs on terga blackish, dense blackish hairs forming prepygidial and pygidial fimbriae and also on S6.

Type material: Holotype male, allotype female, and two male paratypes: Argentina: Santiago del Estero Prov., Depto. de Matará, Desvío 511, 24 October, 1928 (M. Gómez) [Lawrence, one paratype, Buenos Aires]. One male paratype, Santiago del Estero Prov., Las Termas, on *Prosopis alba*, Oct. 11, 1972 (G. E. Bohart) [Logan]. One male paratype, Catamarca Prov., Colpes, on *Zucagnia*, Oct. 29, 1972 (G. E. Bohart) [Logan]. One male paratype, Catamarca Prov., Andalgalá, on *Prosopis alba*, Oct. 25, 1972 (G. E. Bohart) [Logan].

Etymology: From the Latin *annectens*, meaning linking or joining, with reference to the similarity of this species both to *Leioproctus* and *Lonchopria*.

Lonchopria (Biglossa) longicornis new species

This is a moderate sized, rather slender non-metallic species. The beveled preapical tooth of the male mandible is a particularly distinctive feature. (Fig. 27)

Description: Nonmetallic black with pubescence largely pale, forming narrow basal and apical tergal bands in female. Flagellum of male with all segments more than twice as long as broad.

Male: Length 8-11 mm; forewing length 7.0-7.7 mm. *Structure.* Eyes strongly converging below except for upper extremities which converge above. Ocelloccipital distance about 1.5 ocellar diameters; interocellar distance over 2 ocellar diameters and about equal to ocellular distance; distance from anterior edge of median

ocellus to posterior edge of vertex much less than to antennal sockets. Vertex behind ocelli raised, convex. Clypeus scarcely protuberant, protruding less than half eye width in front of eye; clypeoantennal distance about equal to diameter of socket; malar area linear. Labrum twice as broad as long with a pair of strong round, shining, submedium convexities near base; apical margin medially truncate. Mandible with strong preapical ventral angle and with beveled preapical tooth (Fig. 27f). Glossal lobe about as long as wide; labial palpus less than half as long as prementum; maxillary palpus extending beyond apex of galea. Antennal scape reaching anterior ocellus; flagellum reaching base of metasoma, not as wide as scape, slightly tapering except last segment which is slightly broader than penultimate one, adjacent segments all subequal in length but lengths increasing progressively toward apex, basal segment near 2.5 times as long as broad, distal ones well over three times as long as broad. Line margining propodeal triangle strongly pitted. Second submarginal cell with posterior margin equal to or slightly shorter than posterior margin of third; basal cells of wing with hairs sparse, cells first Cu of forewing and Cu of hind wing nearly hairless, cell R of both wings with large hairless areas; jugal lobe of hind wing not reaching level of cu-v, about three fifths as long as vannal lobe measured from wing base. Basitibial plate with hairs not hiding surface, with strong carina, highest apically, on posterior margin but undefined on anterior margin. S6 with longitudinal ridge, narrow and bare basally, broad and hairy apically toward roundly truncate or weakly emarginate apex of S6. T7 densely hairy apically, apparently rounded, basally with shiny bare area tapering to point well before apex of T7. Terminalia as in Fig. 27a-e. *Surface*. Lower two fifths of clypeus convex, shining, impunctate except near margin; sublateral part of clypeus with convexity continued upward but not reaching summit of clypeus and with scattered hairs and coarse punctures; supraclypeal area shiny and impunctate except laterally; upper depressed, central part of clypeus about as long as broad, closely punctate; rest of head strongly but less coarsely punctured, more finely so around ocelli and lateral to them than elsewhere, nearly impunctate near inner orbits, ground between punctures minutely lineolate; scutum and scutellum with punctures coarser, close marginally but centrally, especially on posterior median part of scutum, separated by more than a puncture width of shining ground; rest of thorax and metasomal terga with coarse punctures, finer than those of scutum, mostly separated by about a puncture width (less on much of mesepisternum) of shining but minutely roughened ground; lower part of hypopimeral area impunctate. Propodeal triangle shining, basally with a few fine, weak, transverse striae. T1-5 with marginal bands slightly depressed, translucent, impunctate or with scattered fine punctures basally. S1-5 with

minute, widely scattered punctures on minutely roughened ground; margins smooth. *Color*. Black, flagellar segments 2-10 light brown beneath, 11 darker brown beneath; distal tarsal segments, mandibular apex and spot on tegula brownish; margins of T1-6 and S1-5 translucent brown. Tibial spurs testaceous. Wings slightly dusky, veins and stigma brownish black. *Vestiture*. Pubescence long, obscuring but not completely hiding face, almost as long on T1-3 as on thorax, progressively shorter on posterior terga, forming weak white apical bands on sides of T2 and on T3-5. Pubescence dull white, dusky on vertex; black on discs of scutum and scutellum; black hairs intermixed, mostly preapically, on T3 and 4; most hairs of disc of T5 black; T6-7 with hairs blackish brown; S2-4 with long white apical fringes, S5 with similar but denser and slightly yellowish fringe, S6 with short, mostly erect, yellowish hair radiating in all directions from distal median elevated area.

Female: Length 10-11 mm; forewing length 8 mm. Agrees with description of male except for usual sexual features and the following: *Structure*. Vertex somewhat shorter and less raised behind ocelli than in male. Labrum more than twice as broad as long, almost entire surface strongly convex with narrow longitudinal depression separating two weak convexities, only narrow apical margin thin, depressed, and bearing labral fringe; apex rounded. Mandible unmodified. Antennal scape reaching posterior ocellus; flagellum distally slightly wider than scape, segment 1 over 1.5 times as long as wide, 2 wider than long, 3 about as long as wide, 4-10 progressively longer so that middle flagellar segments are slightly longer than broad (as long as broad in some positions). Basitibial plate fully delimited, apex rounded, surface hidden by dense short hairs. Pygidial plate with apex rounded. *Surface*. Lower as well as lateral convex parts of clypeus smooth, shining, with coarse punctures separated by a puncture width or more; lateral convexity reaching summit of clypeus; smooth impunctate part of supraclypeal area small (less than one third as wide as supraclypeal area), convex, oval or widened at lower end; posterior median part of scutum impunctate; side of thorax (including side of propodeum) with punctures almost as close as they can be (except for impunctate lower part of hypopimeral area). Propodeal triangle slightly shining, basally sometimes with fine, weak, transverse striae. T1 with punctures rather coarse (slightly finer than those of side of thorax), separated by an average of about a puncture width, much finer near posterior margin; remaining terga finely punctate, like marginal zone of T1; posterior marginal, translucent, nearly impunctate zones extremely narrow; bases of sterna with punctures fine like those of terga but distal parts much more coarsely punctate, margins narrowly depressed, smooth, translucent. *Color*. As described for male (eleventh flagellar segment absent); brownish margins of sterna and especially

terga extremely narrow. *Vestiture*. Pubescence not conspicuously long, mostly not obscuring surface, only basal half of T1 with long hairs like those of thorax; T1-4 with narrow apical bands of dense white hairs, on T1 sometimes broken medially, on T4 slightly wider than on other terga; T2-5 with narrow postgradular bands of white hair, commonly hidden under preceding terga; hair of head dull white (yellowish on mandibles, labrum, lower margin of clypeus) except black across vertex behind ocelli; hair of scutum and scutellum black except for dull white margins; rest of thorax with hair dull white except for black (sometimes absent) on upper part of mesepisternum, small laterobasal part of propodeum, and center of metanotum; hairs of tibiae and especially tarsi yellowish, coppery to dusky on outer sides of mid and hind tibiae, those of apical truncation of hind femur and vicinity of basitibial plate blackish; T1 with long dull whitish hair on basal half, rest of terga, except for white bands described above, with hairs blackish, short except for strong, dense, pygidial and prepygidial fimbriae, sterna with hairs yellowish white, forming long preapical white fringes on S2-4 and even longer, dense, yellowish fringe, similar to that of male, on S5.

Type material: Holotype male, allotype female, and one male paratype: Argentina: Catamarca Prov., Ruta 4 five km south of El Rodeo, 1450 m altitude, Feb. 8, 1984 (R. B. Roberts) [Lawrence; paratype, New Brunswick]. Seven female paratypes: Catamarca Prov., Andelgala (Internat. Biol. Prog., J. L. Neff) Mar. 14 and 19, 1973; Jan. 30 and Oct. 10, 1974, on flowers of *Solanum*; two female paratypes: same locality, Jan. 26, 1974, on flowers of *Baccharis* [Austin, one at Lawrence, two at Buenos Aires].

Lonchopria (Biglossa) robertsi new species

This small species is easily recognized in the female by the rather uniformly spread pale hair on the dorsum of the metasoma and in the male by the strongly bidentate T7. (Figs. 28, 31g)

Description: Nonmetallic black with pubescence largely pale, forming apical tergal bands in male but in female uniformly spread over T2-4 so that tergal bands are absent. T7 of male and pygidial area of female ending in two strong spines (Fig. 28j).

Male: Length 7-9 mm, forewing length 6.5-8.0 mm (7 mm in holotype). *Structure*. Eyes strongly converging below except for upper extremities which converge above. Ocelloccipital distance about 1.5 ocellar diameters (little over one diameter to beginning of declivity); interocellar distance 2.5 ocellar diameters, greater than ocellocular distance; distance from anterior edge of median ocellus to posterior edge of vertex less than to antennal sockets. Vertex behind ocelli raised, convex. Clypeus protruding over half of eye width in front of eye; clypeoantennal distance greater than diameter of socket; malar area linear. Labrum slightly less than twice as broad as long, basal half

convex with fine punctures; apical margin medially sub-truncate. Mandible with rounded pre-apical ventral angle and with preapical angle but no distinct tooth on upper margin (Fig. 28g). Glossal lobe over twice as long as basal width; labial palpus less than half as long as prementum; maxillary palpus extending to apex of galea. Antennal scape almost reaching anterior ocellus; flagellum reaching little beyond tegula, as wide as scape, of uniform width, all segments longer than broad, first two segments slightly shorter than others, middle segments about 1.5 times as long as broad, last segment longer than others. Line marginating propodeal triangle only minutely pitted. Second submarginal cell with posterior margin about equal to that of third; closed cells of fore wing hairless except a few hairs in distal cells, of hind wing similar but with few minute hairs; jugal lobe of hind wing reaching level of cu-v or nearly so, roughly two thirds as long as vannal lobe. Basitibial plate shiny, hairless, defined by carinae, apex narrowly rounded. S6 as described for *L. longicornis* but longitudinal ridge feeble. T7 strongly bidentate (Fig. 28j), densely hairy laterally but nearly bare elsewhere. Terminalia as in Fig. 28a-c. *Surface*. Clypeus as described for *L. longicornis* but sublateral convexities broader, almost impunctate and hairless; supraclypeal area with elevated, triangular (pointed above), impunctate region, sides closely punctate; upper, depressed, central part of clypeus longer than broad, closely punctate; rest of head less coarsely punctate, more finely so behind and lateral to ocelli where some areas have only rather sparse, small punctures, strip along inner orbit nearly impunctate; ground between punctures shining, minutely roughened on frons; thorax and metasomal terga more coarsely punctured than head, punctures separated by more than a puncture width of smooth, shining ground on discs of scutum and scutellum, and on posterior and dorsolateral surfaces of propodeum, elsewhere on thorax closer and interspaces minutely roughened; lower part of hypopimeral area impunctate; T1-3 with punctures somewhat finer than on most parts of thorax and mostly separated by over a puncture width of smooth, shining ground; T4-6 with punctures progressively coarser and closer. Sterna with small punctures separated by minutely roughened ground. Propodeal triangle shining, minutely transversely roughened. T1-6 with marginal zones depressed, with well separated small punctures. *Color*. Black, apex of mandible, labrum, and of tibiae brown; tarsi brown but mid and hind basitarsi and sometimes other segments infuscated; tegula largely brown; posterior margins of T1-4 weakly brownish, of T5-6 translucent brownish, of S1-6 and apex of S8 light brown; T7 variably red brown. Tibial spurs pallid. Wings clear, veins and stigma brown. *Vestiture*. Pubescence long, largely obscuring surface on punctate parts of face, on T1 as long as on thorax but shorter on rest of metasoma, forming apical bands of appressed white hair on T1-5, weakly at sides of T6, and strongly on S2-5; elsewhere more or less erect. Hair white

on lower part of face and ventral surfaces of head and thorax, elsewhere (except for white metasomal bands) dull yellowish white except as follows: sometimes a few dusky hairs laterally on vertex (not in holotype); discal hairs of T3-5 and base of T6 dusky; T6 and 7 with hairs largely pale coppery. Lateral areas of T7 with short, dense hairs. Discal hairs very short on S3-6 but white apical fringes long on S3-5; hairs of S6 as in *L. longicornis*.

Female: Length 9-10 mm, forewing length 7.7 mm. Agrees with description of male except for usual sexual features and the following: *Structure*. Vertex shorter and less raised behind ocelli, ocelloccipital distance little more than ocellar diameter. Labrum less than twice as broad as long (Fig. 28i), apex rounded. Mandible nearly as broad preapically as at base (Fig. 28f). Antennal scape nearly reaching posterior ocellus, flagellum distally slightly wider than scape, segment 1 longer than broad, 2 broader than long, 3-9 about as long as broad. Basitibial plate with surface hidden by dense, short hairs. Pygidial plate with apex emarginate, produced to strong tooth at each side. *Surface*. Posterior median part of scutal disc, on each side of punctate median zone, nearly impunctate. Metasomal punctures much finer than those of most parts of thorax except on T5 and apices of sterna. *Color*. Apices of mandible and labrum red; basitarsi and apices of tibiae not brown; underside of flagellar segments 3-10 brown; tergal margins not brown or translucent (weakly brownish in some paratypes); pygidial plate reddish black. Tibial spurs testaceous, reddish brown on posterior leg. *Vestiture*. Not obscuring surface, not forming tergal hair bands. Hair of vertex dusky, of thoracic dorsum fulvous with scattered black hairs on scutum and scutellum. T1 with erect pale fulvous hair except posteriorly; T1 at apex and T2-4 with appressed pale fulvous hair spread over tergal surfaces and sparse, often dusky, more erect hairs, longer and blacker on T4; T5-6 with dense black hairs that appear light gray in some lights. S2-5 with long apical white fringes, otherwise sterna with fulvous hair. Hair of legs yellowish white, darker on inner surfaces of tibiae and tarsi, brown on outer surfaces of tibiae; scopa brown, grading to white on lower margin of tibia.

Type material: Holotype male, allotype female, eight male and one female paratypes: Argentina: Tucumán Prov., 5 km east of Amaicha, 2300 m altitude, Nov. 26, 1983 (R. B. Roberts) [Lawrence]; paratypes, Buenos Aires, Lawrence, New Brunswick, Curitiba]. Other paratypes, all from Catamarca Prov., as follows: Four males, five females, Andalgalá desert site, Oct. 22 and Dec. 19, 1972; Oct. 7, 8, 9, 1973 (Internat. Biol. Prog., J. L. Neff) [Austin]. One male, Andalgalá, Dec. 10, 1972 (IBP program, desert scrub site, J. L. Neff) [Austin]. One female, Minas Capillitas, Dec. 4, 1973 (J. L. Neff) [Austin]. Three males, one female, El Pucará, Nov. 11, 1972 (IBP Research Site, J. L. Neff) [Austin]. Five males, three females, 15 km southeast of Andalgalá, Oct. 25, 1972 (G. E. Bohart) [Logan]. One female, same data but 15 km east. Ten males, five females, Joyango, Oct. 30, 1972 (G. E. Bohart) [Logan, two pairs Lawrence]. One male, two females, 35 km west of Andalgalá, Oct. 24, 1972 (G. E. Bohart) [Logan]. One male, Cuesta de la Chilca, Aug. 30, 1968 (A. Willink) [Logan]. One male, one female, Londres, Oct. 21, 1972, on *Larrea cuneifolia* (G. E. Bohart) [Logan].

Most of the paratypes collected by J. L. Neff were on flowers of *Larrea divaricata* although three males were on *Prosopis nigra* and three females were on *Bulnesia retama*. Except as otherwise noted, the paratypes collected by G. E. Bohart and A. Willink were on *Larrea divaricata*.

Other material: One male: Chubut Prov., Pen. Valdez, Nov. 25, 1973, on *Larrea divaricata* (J. Neff) [Austin].

Comments: Some of the material from J. L. Neff has been labeled by him with a Moure manuscript name meaning wooly, probably with reference to the widespread pale (although appressed and straight) hair of T2-4 of the female.

Etymology: This species is dedicated to the memory of the late Radclyffe B. Roberts who collected an excellent series of this species as well as many other interesting Argentine bees.

Colletes grisellus new name

Colletes griseus Smith, 1879:2, preoccupied by *Monia grisea* Westwood, 1875:222, transferred to *Colletes* in the present paper. *C. grisellus* is from Oaxaca, Mexico.